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# THESIS

DIFFERENCES IN
AIRCRAFT ACQUISITION MANAGEMENT PRACTICES
BETWEEN THE AIR FORCE AND THE NAVY

by

Terry Edward Magee

June 1977

Thesis Advisor: Commander A. Crosby, USN

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# DIFFERENCES IN AIRCRAFT ACQUISITION MANAGEMENT PRACTICES BETWEEN THE AIR FORCE AND THE NAVY

by

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the requirements for the degree of

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## ABSTRACT

The purpose of this thesis is to provide a comparative view of aircraft procurement in the Air Force and the Navy. It is not the intent of the author to evaluate concepts or procedures, or to offer judgments on either service's efforts. It is instead an attempt to delineate in detail where the services' approach to a major aircraft procurement differ, problem areas encountered and avenues of solutions pursued. Addressed will be organizational structure, Project Manager responsibility, financial management, documentation, information flow, personnel assignment, functional responsibility and the operating environment.

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# I. INTRODUCTION

In today's society there is increased emphasis on reduction of waste in the government. With this prevailing attitude a major aircraft acquisition draws considerable attention and becomes a focal point and many times a target for exposure of unfrugal practice in the management of scarce resources. This creates an environment of intense pressure, constant high-level exposure and frustration for those tasked with managing the acquisition, the Program Manager and his office.

In Fiscal Year 1976 the total Department of Defense Military Budget was $95,711,562,000. Eight percent of the budget or $7,615,865,000 was appropriated for aircraft procurement. The appropriation for Aircraft Procurement, Navy, was $3,354,465,000 or 3.5% of the total DoD Budget (Military). The appropriation for Aircraft Procurement, Air Force, was $3,933,700,000 or 4% of the total DoD Budget (Military). Over 28% of its Aircraft procurement appropriation was used by the Navy to purchase 74 F-14 aircraft. Over 25% of its Aircraft procurement appropriation was used by the Air Force to purchase 105 F-15 aircraft. In FY 76 approximately $2 Billion was dedicated to the purchase of F-14 and F-15 aircraft for the Air Force and the Navy. For Fiscal Year 1977 over 9.5 billion dollars will be appropriated for aircraft procurement in the Department of Defense. Approximately 31% of this will be dedicated to the purchase of 108 F-15 aircraft and 72 F-14 aircraft.[1]

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[1] The Budget of the U. S. Government. 1978.

The enormous amount of money appropriated for the procurement of aircraft in DoD is broken down by program category which corresponds to aircraft type. This is then entrusted to the Program Manager and his office for management.

The Program Manager and those working for him have the awesome responsibility of managing the ultimate delivery of the end product, the aircraft, in accordance with performance requirements; within the limitations of their budget, and within the time schedule specified. The Program Manager is thus a top-level busines[illegible]ecutive tasked with planning, organizing, directing and [illegible]inating all program activity within his resource limit and then evaluating performance for his acquisition. Ultimately the Program Manager has to bear the responsibility for the success or failure of his charged Aircraft Acquisition.

The differences in organizational structure, functional responsibility and managerial techniques between the Air Force and the Navy in the management of Aircraft Acquisitions will be the primary topic of this thesis. The Acquisition of the F-14 by the Navy and the F-15 by the Air Force will be used as case studies to identify the differences by example. Problem areas encountered and methods utilized to solve these problems will also be addressed with regard to the acquisitions of the F-14 and F-15.

The objective of the thesis is to provide a detailed description of the differences in Aircraft Acquisition Management between the United States Navy and the United States Air Force.

These service sisters, although autonomous units, are still members of the parent organization, the Department of Defense. As such, their programs should be oriented to achieving the organizational objective, National Defense. Attainment of this ambiguous output measurement is governed by general organizational guidelines from the Department of Defense but specifics in Aircraft Acquisition are discretionary procedures applied by the individual services and guided by their strategies.

## II. BACKGROUND

The object of this chapter is to provide the reader with sufficient background material to enhance his ability to understand the differences in the Acquisition Management process between the Air Force and the Navy in Aircraft Procurement. Armed with background data the reader should be able to fit the differences into context, understand the rationale behind the differences and comprehend the impact these different management approaches have on the total Acquisition Process. Discussed in this chapter will be a typical Aircraft Acquisition Cycle in the Department of Defense, the evolution of the basic management concept used in DoD Aircraft Procurement today, the aerospace industry's conduct as the seller in the procurement process and finally some basic data on the F-14 and F-15 aircraft that is needed if the analytical case study mode is to be used.

## A. TYPICAL DOD AIRCRAFT ACQUISITION CYCLE

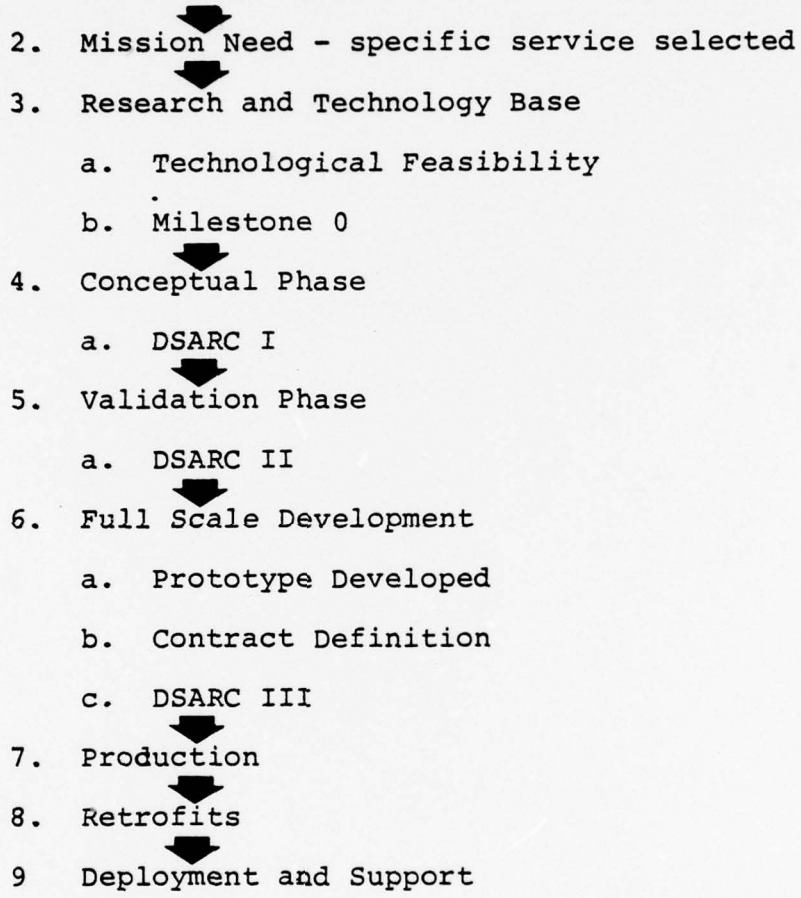
To comprehend the complicated world of aircraft procurement and the intricacies of Program Management one must be familiar with the typical cycle that is evident in most Department of Defense major Aircraft Acquisitions. This cycle applies regardless of the service designated as sponsor and tasked with the Acquisition Management. Initially it is helpful to identify the distinct difference between buying major systems in the Defense Department and buying major systems in the commercial sector. Buyers and sellers of commercial systems, specifically aircraft, do not usually arrive at a purchase and sales agreement until at least one aircraft of the proposed type has been developed and tested for effectiveness. Buyers and sellers of military aircraft, however, agree upon a firm estimate of cost and fee before the product even exists. Usually the Department of Defense funds the research, design and development. As the Aircraft progresses through its life cycle, the concomitant management process involves trade-off decisions regarding schedules, costs and technical performance. Thus the basic economic concept of supply and demand which determines market prices in the commercial sector is removed in defense procurement. The Defense Department being a non-profit organization with a demand that must be filled to meet national defense objectives immediately finds itself in a unique position when dealing with the Aerospace Industry.

The acquisition of an aircraft is generally a two-stage process. The first stage includes planning, research,

development, testing and evaluation. The second stage is production. To understand the stages and the sequence of events that takes place in each stage, a Life Cycle Management Model built around a time line is of great help. (See Figure 1.) Steps 1 through 6 make up Stage 1, while steps 7 through 9 make up Stage 2. To elaborate on and explain some of the steps involved, a brief description follows.

Initially in Step 1 the Department of Defense identifies a security threat, from which a mission need is defined. Service proposals to initiate a major weapons system project to fill the need are advanced. With a favorable top-level decision at Milestone 0 (Step 3), a project is initiated to identify alternative ways to fulfill the mission. This will involve the individual military service selected most suitable to perform the mission, interested aerospace contractors, and contracted consulting firms in a coordinated effort conducted with funds provided by Congress in the form of RDT&E (Research, Development, Test and Evaluation) appropriations. Out of this effort comes a program concept with a proposed tedhnically-feasible approach (e.g. an aircraft). At the end of this process, which occurs late in Step 4, DSARC I occurs. This is an extensive review of the Program to date by a Defense System Acquisition Review Council. There are three DSARC's in any Acquisition Cycle. They are extensive and detailed reviews of the program to date by Assistant Secretaries from the Office of the Secretary of Defense. The DSARC evaluates the entire

FIGURE 1


1. Threat Assessment
2. Mission Need - specific service selected
3. Research and Technology Base
a. Technological Feasibility
b. Milestone 0
4. Conceptual Phase
a. DSARC I
5. Validation Phase
a. DSARC II
6. Full Scale Development
a. Prototype Developed
b. Contract Definition
c. DSARC III
7. Production
8. Retrofits
9 Deployment and Support

Program for effectiveness, cost, integration into the projected national defense picture and feasiblity of continuing. The DSARC then makes its recommendations regarding the program to the Deputy Secretary of Defense (DEPSECDEF). The DEPSECDEF makes the key system decision (proceed, modify or cancel) based mainly on the DSARC's recommendation. One can see that effective, impressive and knowledgeable presentations to the DSARC are essential to the Program's existence. All three DSARC's are equally critical, and a decision to proceed is required before the Acquisition Cycle advances to the next step. (Preparation for a DSARC will be addressed in a subsequent chapter.) If DSARC I results in the decision to proceed, the Cycle progresses to Step 5, which is the validation phase. During Validation refined design development on the aircraft is conducted. Extensive testing is undergone all with the intent of achieving validation at DSARC II. This is a crucial step for if validation is achieved through DSARC II, funds are then usually committed to development of an aircraft buy. This lot buy is very small and usually involves the prototype aircraft for testing. If validation is achieved through DSARC II, the Acquisition Cycle advances to Step 6. This is full-scale development and involves three very important processes in the Acquisition Cycle. The first of these is development of a prototype, which either confirms or disavows that the aircraft can achieve in the air capabilities designed by the use of models. Engineering development is conducted on the prototype. This

involves extensive prototype testing and the elimination of discrepancies which eventually leads to parameters for production. The second of the important processes is contract definition. This is the evolution by which a contractor is selected and a contract awarded. The contract definition process is extremely important and for an adequate background in aircraft procurement deserves a more detailed description.

Contract Definition is divided into three phases. The first is Request for Proposal (RFP). This is a detailed document sent out by the Department of Defense to all contractors that are interested, and more importantly, determined capable by DoD through the service sponsor of producing the desired aircraft. The RFP is an extensive and technically-oriented document containing all the parameters required for the aircraft and its system. The second phase in Contract Definition is the awarding of contracts, under which each interested contractor prepares proposals for the engineering development effort. These proposals are then submitted to DoD through the service sponsor for consideration. The third and final phase in Contract Definition is that of source selection. The proposals submitted by the contractors are evaluated. This is an extremely complex and time-consuming process. The intense competition between Aerospace Industry firms for Defense business dictates that the contractor's proposals be very detailed and inclusive in an attempt to win the contract. The proposals for an aircraft usually run into thousands of pages and are

examined by a formal source selection process headed by a Source Selection Authority. This is usually the Secretary of Defense or his Deputy. Working for him will be a Source Selection Advisory Council, which establishes criteria and assigns weighting to various aspects of the aircraft (speed, cost, firepower, etc.) and contractor capability. A Source Selection Evaluation Board also works for the Source Selection Authority on the selection process. Its function is to do the in-depth analysis of the submitted proposals. The Source Selection Evaluation Board's analysis, conclusions and recommendations are forwarded to the Council, which weights various areas and summarizes data. It includes its own conclusion and recommendations and this is then sent to the Source Selection Authority. The Source Selection Authority takes the analysis and recommendations made by his Council and Board on all the contractors' proposals, evaluates them, confers with those negotiating contract specifics with prospective contractors and finally makes his selection. This process can take anywhere from four to nine months. Concurrently with the selection process, negotiations with contractors who submitted proposals are conducted on contract specifics. At this point the third important process in this step takes place. This is DSARC III. The decision in DSARC III is whether, based on program progress to date, production should be entered into. If the decision is to proceed into production, the negotiated contract is signed and the contract is awarded. With the awarding of a contract we complete Stage I of the Acquisition Cycle.

Stage II begins with the contractor producing the desired aircraft according to a negotiated schedule. The production aircraft are then tested, evaluated, and if need be, retrofitted to meet required standards and finally they are delivered for deployment and operational use. Contracted support for the aircraft is supplied by the contractor throughout the operational life of the aircraft. This completes a typical Aircraft Acquisition Cycle in the Department of Defense. Time involved in the cycle is determined by the complexity of the aircraft and the size of the buy. The F-14 Acquisition Cycle will span a 13-year period and the F-15 Acquisition Cycle is proposed to be in excess of 14 years.

## B. EVOLUTION OF PROGRAM MANAGER CONCEPT IN AIRCRAFT PROCUREMENT

In the Aircraft Acquisition Cycle the need for a Program Manager is identified at Step 3, Milestone 0, in the diagrammed life cycle model (Figure 1). Shortly thereafter the Project Manager is selected, assigned, his office created and staffed and responsibility for the Aircraft Acquisition Management delegated. It is then the Program Manager takes control and acts as a conductor trying to guide the process through the major part of the Acquisition Cycle. The Program Manager tries to develop and tailor an acquisition strategy for the balance of the program and to make trade-off decisions in aircraft capability, cost, schedule and risk within stated ranges based upon the basic strategy.

A brief history of how the present method of managing not only Aircraft Acquisitions but all Major Weapon System Acquisitions in DoD evolved will be beneficial as a starting point in understanding the differences exhibited between the Navy and the Air Force in their management of Aircraft Acquisitions.

Prior to the mid-1950's, military procurement, and more specifically, Major Weapon System Acquisition was done by a task-oriented management organization which was a service mixture and worked on several weapon system acquisitions simultaneously. This was found to be inefficient and lacking in control, especially of spending. These groups were found to be handling too many projects and were not exercising proper control in the acquisition process due to lack of familiarity and involvement. These supposed task-oriented management groups were acting more as reviewers instead of directors and controllers in the process. Consequently, as an attempt to centralize and strengthen the management and allocation of resources for programs most critical to the nation's defense posture or most costly to the Department of Defense, Project Management Offices were conceptualized and introduced. Under this system, the Project Management Office, under a Project Manager, deals exclusively with one specific Weapon System Acquisition and manages that Weapon System Acquisition Cycle from its introduction until the buy is complete and all units are operationally deployed.

Under the Project Manager concept of Major Weapon System Acquisition Management have evolved three distinct organizational structures. The first is a functional organization where the Project Manager alone tries to coordinate and direct the activities of already established staffs and specialists in other organizations which are put at his disposal. The second type is a project organization where the Project Manager has a permanently assigned staff to accomplish all needed objectives. This staff is typically divided into Divisions with each Division being responsible for a certain area of the Acquisition process and in reality is a self-contained Systems Program Office within a Systems Program Office. The size of the staff varies depending upon the level of technology, cost and intricacy of the Weapon System being procured, but will generally range from 150-300 people. The third type of organization has been termed Matrix. This type of organization will have a small staff of personnel permanently assigned and who are delegated responsibility for specific areas of the acquisition. They then will draw upon existing staffs and specialists in other organizations as the need arises.

The Navy utilizes the Matrix organization in its Project Management Offices for the Acquisition of Aircraft. The Air Force on the other hand employs the project organization structure in its Program Management offices in Aircraft Acquisition. The reasoning behind the selection of these two approaches will be discussed at length later in the paper.

## C. CONDUCT OF THE AEROSPACE INDUSTRY AS THE SELLER IN AIRCRAFT PROCUREMENT

There are two principals in any aircraft procurement: the buyer, a DoD Service Unit, and the seller, a company of the Aerospace Industry. To understand the environment in which a Project Manager operates and its effect on the management process of an aircraft acquisition, a basic understanding of the Aerospace Industry, its approach to the acquisition process and its attitude is necessary.

Presently the Aerospace Industry is one of the ten major industries in this country.[2] This ranking is based on a combination of sales, net worth, assets, employment and, interestingly enough, not on profitability.

For the 10-year period from Fiscal Year 1966-Fiscal Year 1976, approximately 17 of the top 20 DoD companies were Aerospace Industry companies. For the same period, 41 out of the top 100 DoD companies were from the Aerospace Industry. Approximately 58 percent of the net value of military prime contracts awarded to the top DoD companies were awarded to the 41 Aerospace Companies for this period. The industry supplies 58 percent of the Navy's contractual business and almost 70% of the Air Eorce's. It is interesting to note that most of the contracts awarded to other than Aerospace Industries are basically presupposed upon the aircraft industry producing an effective weapon system in the support of the other contracts.

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[2] Moody's Industrial Manual - 1977.

DoD has been and will continue to be heavily dependent on the aircraft industry to develop and fulfill its hardware and technological needs.[3]

To relate to the specific cases that will be used in this thesis in Fiscal Year 1976, McDonnell Douglas Corporation, the prime contractor for the Air Force's F-15 received 5.87 percent of the money dedicated in the Department of Defense Budget for military prime contracts of $10,000 or more. This amounted to approximately $2,464,563,000. The greatest percentage of this was for the procurement of 105 F-15 aircraft. For the same period, Grumman Corporation, the prime contractor for the Navy's F-14, received 2.34 percent of the money dedicated in the Department of Defense Budget for military prime contracts of $10,000 or more. This amounted to $982,026,000 of which a large percentage was for the procurement of 74 F-14 aircraft.[4]

The history of the Aerospace Industry is very cyclical in nature and illustrates the government's paternalistic feelings towards the industry. In 1909 the Army purchased an airplane from the Wright Brothers for evaluation of its possible military worth. This coupled with the American entry into World War I prompted the Army to ask for a large buildup in the Aviation area. Congress responded by voting 640 million dollars for

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[3]Standard and Poor's "Aerospace Current Analyses," November 27, 1976.

[4]"Top 100 Defense Department Contractors," Aviation Week and Space Technology, 14 March 1977, p. 51.

military aviation in 1917. This available money attracted many entrepreneurial companies into the aircraft building business. These companies were mainly off-shoots of the auto industry where resources and production lines already existed. With the coming of the Armistice, the industry was thrown into utter chaos. The military had no foreseeable need for aircraft and they consequently cancelled contracts and sold surplus aircraft. Many of the aircraft production companies went out of business and the only thing that saved the major companies in the industry was Government intervention with subsidization and legislation in the form of the Kelly Act of 1925 and the National Air Law of 1926. Thus the first cycle is complete and the paternalistic attitude of the government has been fostered.

The Industry was rejuvenated by Lindbergh's epic flight in 1927. This kindled the flame of transportation by air and created a demand for commercial aircraft.[5] Most of the major aerospace companies as we know them today were born at this time. Also the Aerospace Industry underwent a major transformation into a big business industry with mergers taking place and the evolution of holding companies, investment trusts, consolidated manufacturing companies and big corporations. Congress sensed the Aerospace Industry's impact on the future and continued to pass favorable legislation to help the industry expand and grow.

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[5] Rae, J., Climb to Greatness (Cambridge MA: The MIT Press), 1968.

The Depression of the 30's was very harsh on the Aerospace Industry. Many of the smaller new entrants were forced out of business and the only thing that kept the industry from total collapse was government intervention in the form of five-year programs for production of military aircraft. This completed another cycle in the industry's volatile history.

World War II brought another boom to the industry and its growth and expansion was phenomenal. Aircraft production plants sprang up all over the country centering mainly in po-pubus areas for labor sources. The end of World War II again brought disaster to the industry by 1946. Production had ceased in all but sixteen of the sixty-six airframe plants in operation in January 1944. Again Congressional intervention and subsidy prevented the collapse of the industry.[6] The Korean War brought a sudden need for the Industry's products and it again grew and flourished. This time the Aerospace Industry displayed foresight however. Instead of relying on the present, they took the money they were making from present sales and reinvested it in R&D and began to look to the future markets as they realized the end of the war could bring collapse. Expansion into missile production, commercial jet transports and exploratory research on space travel allowed the industry to weather the storm almost totally on its own when the Korean Conflict ended.

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[6] Simonson, G. (ed.), The History of the American Aircraft Industry, (Cambridge MA: The MIT Press), 1968.

The commercial jet market, continued military production in both missiles and aircraft and the space program supported the industry until the late 1960's and early 1970's. At this time missile production was reduced, the space program had slipped from the limelight and the commercial transport market had been totally exploited except for the jumbo jets which were questionable. Again the saving grace was government intervention. The Department of Defense realized that conventional warfare was not a thing of the past, but of the present and the future. Limiting treaties, a nuclear stand-off and struggles in evolving nations such as Viet Nam demonstrated that for world defense the United States must maintain a superiority in conventional warfare and this meant air superiority and close air support. This brought a resurgence of development of military aircraft to fulfill these mission needs and the industry exploited this field and is its basic area of endeavor today.

Will the industry see another typical cycle of boom then chaos or is it finally inundated with stability. History will answer that question, but one thing is certain. The government has demonstrated that it considers the industry essential for National Defense and will ensure its existence.

The interdependency of the Aerospace Industry on Defense business and the Department of Defense on industry products has been demonstrated. The paternalistic approach of the government towards the industry has been exhibited. How

does this impact the relationship between the Department of Defense and the Aerospace Industry and help shape the conduct of the Aerospace Industry?

The conduct of the Aerospace Industry in dealing with the Department of Defense refers to the patterns of behavior that various companies follow in adapting or adjusting to the Defense Industry market. The importance of structure lies in the way it induces firms to behave. This behavior links the industry's structure to the quality of its performance.[7] One can examine the conduct of the industry through the major sub-elements of conduct that are at work in the operating environment and readily see the impact they can have on the management process of the manager of an Aircraft Procurement. These sub-elements are product strategy, pricing behavior, DoD contracting, research and development and competition.

Product strategy. In the Aerospace Industry in 1976 product lines consisted of government aircraft (26 percent); commercial and private aircraft and equipment (30 percent); missiles, space vehicles, and related hardware (29 percent); and 15 percent for non-aerospace products and services. This superficially may seem inconsistent with the dependency of the Industry on DoD business, but if one adds to this the fact that government aircraft made up the largest part of the aerospace sales amounting to $16.8 billion, the dependency is

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7 Caves, Richard, American Industry: Structure, Conduct, and Performance, Third Ed., Englewood Cliffs, N.J.

extremely evident.[8] The products that the industry sells the Department of Defense are of high-value, low-volume items of a technologically complex nature requiring high funding levels and providing the industry with income in many instances for more than ten years from concept to completion. Thus a fair share of the Defense business is a must if a company is to maintain its ranking and position and prosper accordingly. The Aerospace Industry recognizes this need and consequently attacks the Defense market, which ultimately means attacking the Acquisition Managers, if contract definition has not yet been completed.

Pricing Behavior. The heavy dependence on the Department of Defense for high unit value products lines and the visibility this brings fortunately helps restrict the industry in altering pricing behavior in periods of rapidly changing costs. In this environment cost changes are more penetrating and direct, and the impact is heavier on the single customer, negating indiscriminating pricing.[9] This is a benefit to someone managing the acquisition of an aircraft from the Department of Defense viewpoint, but the industry has been able to circumvent this through contracting and playing on the government's paternalistic instincts as we will see.

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[8] Aerospace Industries Association, Aerospace Facts and Figures, 1975/1976. (New York: McGraw-Hill), 1976

[9] Aerospace Industries Association, Aerospace and the U.S. Economy (Washington, D.C.: Aerospace Industries Association), November 1971.

Department of Defense Contracting with the Aircraft Industry. Major cost overruns on Aircraft procurement have created an extensive search by DoD to find a contracting method to, in some way, stem the floodwaters. Presently in Stage I of the Acquisition Cycle in Aircraft Procurement a cost-plus fee type contract is used to give recognition to the uncertainty involved. Simply translated, this contract provides the Aerospace Contractor with reimbursement of costs incurred plus a negotiable fee. This can be exploited by the Industry, as we will examine in the next sub-element and can create significant problems for the Aircraft Acquisition Manager who is trying to maintain some degree of controllability over incurred costs.

In Stage II of the Cycle, the Production Phase, the Department of Defense has employed a fixed-price incentive contract to try and control costs. The parameters usually utilized in aircraft procurement for incentives are: target cost, range of incentive effectiveness, sharing ratio and target profit. The theory behind the utilization of these fixed-price incentive contracts is that the Aerospace contractor will be influenced to effectively control costs and to make cost-associated trade-off decisions in a way favorable to the government. The concept of the sharing ratio employed in these type contracts illustrates this. The sharing ratio is based on a percentage of a dollar and will state that the contractor's profit will increase the agreed-upon percentage of a dollar for every dollar he saves in cost under the fixed price. Conversely, however

if costs exceed the fixed price the contractor does not bear the entire burden of the overruns. A sharing ratio is utilized which will usually state that the contractor will bear a certain percentage of every dollar in overruns and the government will absorb the remainder.

Also the concept of a ceiling price is utilized in the fixed price incentive contracts as an insurance against massive cost overrun. This ceiling price figure tells the contractor the maximum the government will pay, cost and profit for the completion of the contract no matter what the cost outcome. To try and compensate for the fluctuating and unpredictable economy, escalation clauses are also written into these fixed-price incentive contracts. Escalation is the explicit contractual treatment of price change in which the contract price is adjusted after price changes are measured. Thus input price uncertainty is removed or reduced.[10] Theoretically, the above-mentioned provisions in contracting should enhance the Acquisition Manager's position and provide accountability and controllability. Realistically, this is not the case. The Aerospace Industry finds security in the belief that the government will bail them out because their products are a necessity and even more basic, their existence is a necessity to National Defense. Although they attempt to abide by contract specifics, if difficulties are experienced, especially in remaining within the ceiling price, they are almost assured of being reimbursed and

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[10] Sovereign, Michael G., and Carl R. Jones, "Escalation Provisions for Navy Contracts, Issues and Choices," May 1975.

production continuing for the entire procurement lot. This will be vividly illustrated when discussing the F-14 and the Grumman Company's inability to live within the constraints of its contract due to financial problems in the middle of the production cycle. It is readily evident that the Acquisition Manager can have a relatively weak bargaining position. If the Aerospace Company does not meet its contractual commitment, the Project manager is virtually powerless to penalize the contractor and in the long run an essential aircraft will continue to be produced by that same contractor [It is totally uneconomical to contract with another producer due to mammoth start-up costs and problems of transfer of developed technology.] who ultimately will benefit from the contract.

Research and Development. Research and Development is the life-line of the Aerospace Industry. They must be constantly analyzing future needs, channeling technology and developing products to meet demands. As one reviews the history of aviation, it is easy to see that military aircraft have often paved the way for advances in commercial aviation and one can easily detect a continual cross-feed of technology between the military and applicable commercial sectors.

Competition. Competition between firms in the Aerospace Industry for Defense business is extremely intense. The main purchasers of the Industry's products are the military services.

Although all the services are branches of the Department of Defense, to some extent they compete with each other for military missions, for public funds, and generally deal independently with Aerospace Companies in the procurement of the Industry's products. The Aerospace Production Firms compete by offering superior technical expertise and prompt delivery of their products at a realistic price, because these are the factors emphasized by their military customers. The Industry's basic competence is invention, discovery, and the organization and coordination of the efforts of huge teams of scientists and engineers.[11] The contract definition phase in the Aircraft Acquisition Cycle has been previously discussed. It is an important phase not only to the service involved, but also to the competing contractors. The competing contractors perform design engineering far beyond what was intended in order to enhance the probability that they will win the full-scale development contracts. As a result their proposals are staggering volumes involving large sums of government money and valuable personnel time in the Source Selection Process. Due to the ferocity of the competition in the Industry, attempts by DoD to hold down the magnitude of the documents have been unsuccessful mainly because the bidders hope to win by outclassing their rivals in design refinement.[12]

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[11] Jacoby, Neil H., Corporate Power and Social Responsibility (New York: MacMillan, Inc.), 1973.

[12] Adams, Walter, The Structure of American Industry, 4th ed. The Aerospace Industry by Frederic M. Scherer (New York: MacMillan, Inc.)

One of the biggest headaches in aircraft procurement is the conduct exhibited by the Aerospace Industry caused by competition when the Aerospace Companies utilize a concept known as "buying-in." The government's budgets are published well in advance, so Industry contractors know how many dollars are anticipated as being available for both stages of the Acquisition Cycle. Thus, there is no real price competition, but there is a significant tendency for the contractor to make an unrealistically low bid when the terms of the contract will obligate the government to pay for those costs that exceed the contract price. This is known as "buying-in." [It is especially evident in Stage I of the Acquisition Cycle.] Naturally, the firm which presents the most promising approach is awarded the contract through Source Selection Evaluation and the contracted aerospace firm is aware before it begins that its proposal is optimistic but it is also aware that it can depend on the government to reimburse it on cost overruns. The Acquisition Manager is already in an untenable position and must realistically begin with overruns that are guaranteed and uncontrollable if "buy-in" has been employed. We see the "buy-in" concept at work in both the F-14 and F-15 procurements.

In conclusion the Aerospace Industry is profit-motivated and seeks to maximize its return in a free enterprise environment. The Acquisition Manager needs to be aware of this and

also of the paternalistic attitude towards the industry by the government when he shapes his acquisition strategy and strives for controllability.

One approach by the Aerospace Industry to Defense Business is summed up by Robert S. Tucker, formerly an official in the Office of the Secretary of Defense and now an Aerospace Industry Manager, when he said:

> "A Company which does a thorough and factual job of analysing and pricing the risks attending its proposed approach to system development will more likely than not find itself the loser to a more optimistic competitor. With too little business to go around, survival is inevitably more compelling than objectivity."[13]

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13 Fox, R. J. Arming America, Boston Division of Research, Harvard University, 1974.

D. BACKGROUND DATA ON THE F-14 AND F-15

A brief background of the F-14 and the F-15 and data on development of the two aircraft will be informative and facilitate understanding when discussing the two procurements in the case study mode.

| F-14 TOMCAT - NAVY | F-15 EAGLE - AIR FORCE |
|---|---|
| Prime Contractor: Grumman Aerospace Corporation | Prime Contractor: McDonnell Douglas Corporation |
| Contract Awarded: Jan. 1969 | Contract Awarded: Dec. 1969 |
| Primary Missions: | Primary Missions: |
| (1) Fighter sweep/ escort-clearing contested airspace of enemy fighters and protecting the strike force. | (1) Air Superiority Fighter. |
| (2) Defend carrier task forces via Combat Air Patrol (CAP) and Deck-launched Intercept. | (2) Air-to-Ground Support. |
| (3) Secondary attack of tactical targets on ground. | |
| Operating Environment: | Operating Environment: |
| (1) Carrier Based<br>(2) Land Based | (1) Land Based |
| Length: 61' 10-1/2"<br>Height: 16' 10" | Length: 63' 9"<br>Height: 18" 5-1/2" |
| Weights:<br>Empty = 38,930 lbs<br>Normal Takeoff = 58,539 lbs<br>Max Takeoff = 74,348 lbs<br>Landing Weight (Carrier) = 51,830 lbs | Weights:<br>Normal Takeoff = 41,500 lbs<br>Max Takeoff = 56,000 lbs |
| Max Speed: Mach 2.4 | Max Speed: Mach 2.5 |
| Ceilings:<br>Absolute = 65,000 feet<br>Service = 50,000 feet | Ceilings:<br>Absolute =100,000 feet<br>Combat = 65,000 feet |

| | |
|---|---|
| Approach Speed:<br>(Depends on weight)<br>105-115 knots | Approach Speed:<br>(Depends on weight)<br>125-135 knots |
| Engines:<br>Two Pratt & Whitney TF 30-P-412A turbo-fan engines. | Engines:<br>Two Pratt & Whitney F 100-PW-100 turbo-fan engines. |
| Electronics:<br>(1) Hughes AN/AWG-9 Weapons Control System.<br>(2) Kaiser Aerospace AN/AVG-12 Vertical and heads-up display. | Electronics:<br>(1) Hughes AP6-63 Pulse Doppler Radar Weapons System.<br>(2) Heads up display by International Business Machines Electronic Systems Center. |
| Armament:<br>1 internally mounted M-61A1 Vulcan<br>20 mm multi-barrel cannon (675 rounds of ammo)<br>6 AIM - 54A Phoenix Missiles<br>6 AIM - 7E/F SparrowMissiles<br>4 AIM - 9 6L Sidewinder Missiles | Armament:<br>1 internally mounted M-61A1<br>20 mm multi-barrel cannon (960 rounds of ammo)<br>4 AIM - 9L Sidewinders<br>4 AIM - 7F Sparrow (Air-to-Air Missiles)<br>Provisions for carrying up to 12,000 lbs of ordnance on three weapon stations. |
| Crew: Two -<br>A pilot and in the rear seat a Radar Intercept Officer who controls the detection and engagement aspects of the Weapon System. | Crew: One -<br>Pilot controls both airplane and entire weapons system. |
| First Flight: 21 December 1970. | First Flight: 27 July 1972. |
| Deployed for Operational Use:<br>October 1972. NAS, Miramar, California | Deployed for Operational Use:<br>January 1976. Langley Air Force Base, Virginia |
| Projected Total Procurement:<br>Presently 334 aircraft<br>Hope to gain an increase to 390 aircraft. | Projected Total Procurement:<br>Presently 729 aircraft<br>Hope to gain an increase to 749 aircraft. |
| Total Aircraft Delivered:<br>As of 30 June 1976 = 258 | Total Aircraft Delivered:<br>As of 30 June 1976 = 77 |

| Projected Procurement Completion: 1979 | Projected Procurement Completion: 1981 |
|---|---|
| Total Program Cost: (Projected in Program Base Year Dollars - 1968) $8,676,100,000 | Total Program Cost: (Projected in Program Base Year Dollars - 1968) $12,171,100,000 |
| PROGRAM UNIT COST (PUC) = | TOTAL PROGRAM COST / Total # of Aircraft to be Procured |
| PUC: (This is based on dollar values of the years cited) | PUC: (This is based on dollar values of the years cited) |
| Initially = 8.7 million | Initially = 7.1 million |
| June 1970 = 12.63 million | June 1970 = 8.4 million |
| June 1971 = 13.146 million | June 1971 = 9.8 million |
| April 1974 = 18. million | 1974 = 14.04 million |
| Presently and projected to completion = 20+ million | Presently and projected to completion = 16+ million |

Notes:

At program conception DoD was envisioning the "high-low" concept in its next two Fighter Aircraft Procurements for the Navy and the Air Force. The Navy's F-14 and the Air Force's F-15 would be used for "high-threat areas" with a follow-on now the F-16 for the Air Force and the F-18 for the Navy to be a low cost "low-threat area" fighter.

Presently the F-15 holds six of the eight time-to-height world records.

## III. DIFFERENCES IN AIRCRAFT ACQUISITION MANAGEMENT

### A. GUIDANCE THROUGH DOCUMENTATION AND CHARTERING

The Acquisition Cycle of an Aircraft is primarily controlled by four Department of Defense Documents, as follows:

Department of Defense Directive 5000.1 - Major System Acquisitions which defines that major "systems" are those that: (1) have an estimated RDT&E cost in excess of 75 million dollars or an estimated production cost in excess of 300 million dollars; (2) are of national urgency; and (3) are recommended to be treated as major by a DoD Component Head or OSD official. It also delineates Milestones 0 - III that occur in the Acquisition Process and establishes guidelines for the assignment of a Program Manager, creation of his office and the authority and responsibility this Program Manager has.

Department of Defense Directive 5000.2 - Major System Acquisition Process which provides policies and procedures essential to DoD activities in support of the Secretary of Defense decision-making process for major system acquisitions. It also established the DSARC as the review group for "major systems" for the SECDEF and dictated that the DCP (Decision Coordinating Paper) would be the supporting document for review of major systems by the SECDEF.

Department of Defense Directive 5000.3 - Test and Evaluation which established the responsibilities of the Deputy Director, Defense Research and Engineering, Test and Evaluation

and the requirement for independant test and evaluation of defense systems.

Department of Defense Directive 5000.4 - OSD Cost Analysis Improvement Group which established the CAIG and the requirement for an Independent Parametric Cost Estimate for all major programs.

These four primary DoD documents are supported by a number of related policy documents dealing with specific functional areas in Systems Acquisitions. A list of these documents is contained in Appendix A. Of course the individual services have taken the general guidelines in these documents and have expounded on them in great detail with specifics to cover their unique needs. The two major documents in this area are the Navy Instruction 5000.1 and the Air Force Regulation 800-2 issued by the respective Secretaries. From this has erupted a snowball effect with every command in both services involved in any way with Aircraft Acquisition issuing their own specific directive, instruction or notice. Coupled with this are various acquisition management guides that have been created to aid the Program Manager in his acquisition process. If one were to assimilate all the Directives, Instructions, Notices and Guides applicable in any way to Aircraft Acquisitions, one would be affected by a package of rules that encompass almost five hundred separate directives. Suffice to say that there is enough guidance available to aid in Aircraft Acquisition, but the point

the author would like to make about this documentation is that no matter how specific it is proposed to be, it still deals in generalities for the Program Manager and leaves a majority of the Acquisition Process resting on his good judgment, the expertise available and the management policies he employs. I feel that this is best summed up by a statement out of the primary controlling document, DoD D 5000.1. "Responsibility for the management of system acquisition programs shall be decentralized to the DoD Components except for the decisions retained by the Secretary of Defense." This decentralization permeates down till it finally comes to rest with the Program Manager. It would be impossible and detrimental to try to provide specifics for every contingency that arises due to the uncertainties involved in Aircraft Acquisition. Flexibility in methods of control, documentation and decision criteria as an Aircraft Acquisition progresses through its life cycle is essential, especially as we move forward in history and the environment continually changes.

The Department of Defense Directive 5000.1 states that when the Secretary of Defense approves program initiation at Milestone 0, the DoD component shall assign the program manager for major system acquisition. In the diagrammed cycle model depicted earlier, Milestone 0 corresponds to Step Three. Thus at Step Three the Program Manger is selected, assigned, his office created and he is given the task of the Aircraft Acquisition Management.

In the Navy the assignment of the Program Manager and the creation of his office is done via a charter. The charter is

an official document which creates the need for a Program Manager and his office, assigns the Program Manager, establishes his office and staff, describes his responsibilities, provides sufficient authority to accomplish stated program directives, defines the chain of command, and provides general guidelines. Chartering is a concept employed because it was felt that historically the Program Manager was not being given adequate authority to accomplish program objectives and that Program Managers did not really understand their position or responsibilities in the acquisition process. Chartering was initiated to rectify these deficiencies. The Chief of Naval Material (CNM), under the CNO, is assigned the responsibility for major system acquisitions in the Navy. The CNM is the individual charged with chartering authority. In the case of aircraft acquisitions he delegates his chartering authority to the Commander Naval Air Systems Command (COMNAVAIRSYSCOM). The Commander Naval Air Systems Command is the individual charged with coordinating, monitoring and providing liaison for all Navy Aircraft Acquisitions, aeronautical system acquisition and air-launched missiles acquisitions. To cite our specific example, the Commander Naval Air Systems Command issued a charter in June of 1968 which assigned the F-14/Phoenix Project Manager and established the F-14/Phoenix Project management Office. It was given the identifying number of PMA-241. [All Project Managers for Major System Acquisitions in

the Navy are given an identifying number which originated as a sequential process from the initiation of the Program Manager concept. PMA identifies the office of Project Management Air vice PMS which is Project Management Ship.]

The Air Force differs slightly in the establishment of its Program Office. Chartering is utilized, but in a much more generalized manner. The charter just establishes the need for a Program Manager and the creation of his management office and dictates that it be done. The actual specifics are given through a directive. This directive is called a Program Management Directive (PMD) and is issued by the Commander Air Force Systems Command. This PMD is an offshoot of the Decision Coordinating Paper utilized for DSARC I and specifies assignment of the Program Manager, creation of the Systems Program Office, staffing, responsibility and authority. The Commander Air Force Systems Command is comparable in responsibility and tasking to the Navy's Chief of Naval Material in major system acquisitions. To cite our specific example, the charter for the F-15 program was issued, in early 1969, by Deputy Secretary of Defense David Packard. The specifics followed within a month and were contained in a PMD embodied in AFSC Form 56 which was an offshoot of CDP 19 in the F-15 program. This established the F-15 Systems Program Office with the program office identifier of YF. [All program management offices in the Air Force are coded with a letter code. Y simply identifies it as being part of the

Aeronautical Systems Division and F specifies it to the F-15 Program.]

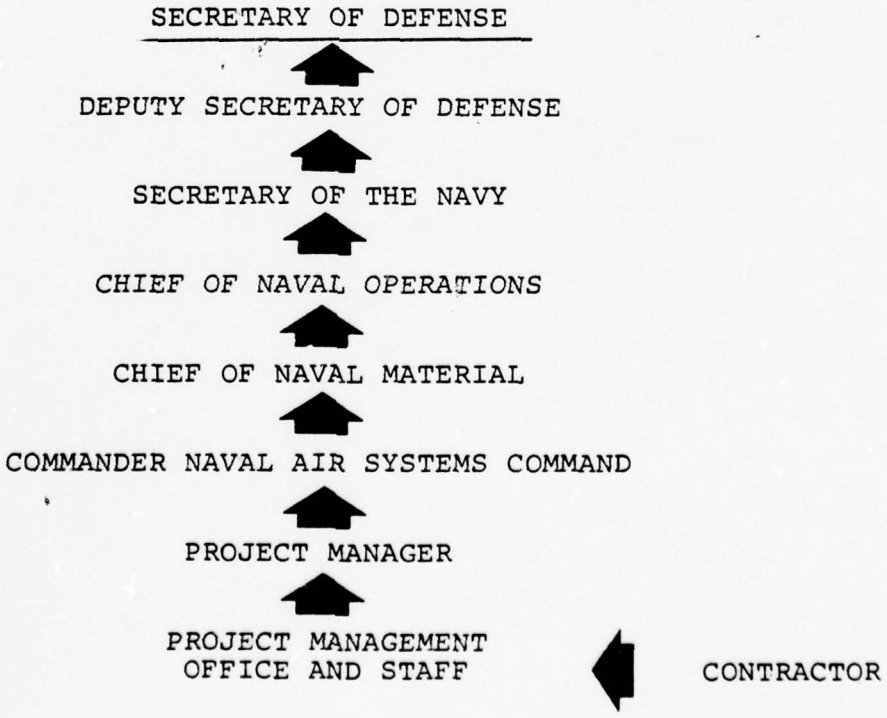
Thus the Navy's use of a charter is much more detailed and the charter itself contains the specifics. It is issued by Commander Naval Air Systems Command as delegated by the Chief of Naval Material. The Air Force uses the charter which is issued by OSD as authority for the Commander Air Force Systems Command to issue his PMD containing needed specifics.

B. CHAIN OF COMMAND/INFORMATION FLOW

Paramount to any successful management effort is a coordinated information system to ensure the proper flow of information in the management hierarchy. In the military, of course, this means Chain of Command.

The Navy's flow of information through the chain of command in aircraft acquisition is depicted on the following chart, (Figure 2).

Figure 2



This diagrammed chain of command is theoretical in nature and is the information flow contained in all official documents. Realistically, of course, it is not this simple. There are many circuitous routes involved and pressures levied by interest groups that are not identified in the official chain of command. Noticeably absent, and paramount to any aircraft acquisition, is the organization that should be sitting on the top of the hierarchy by virtue of control of funds, Congress.

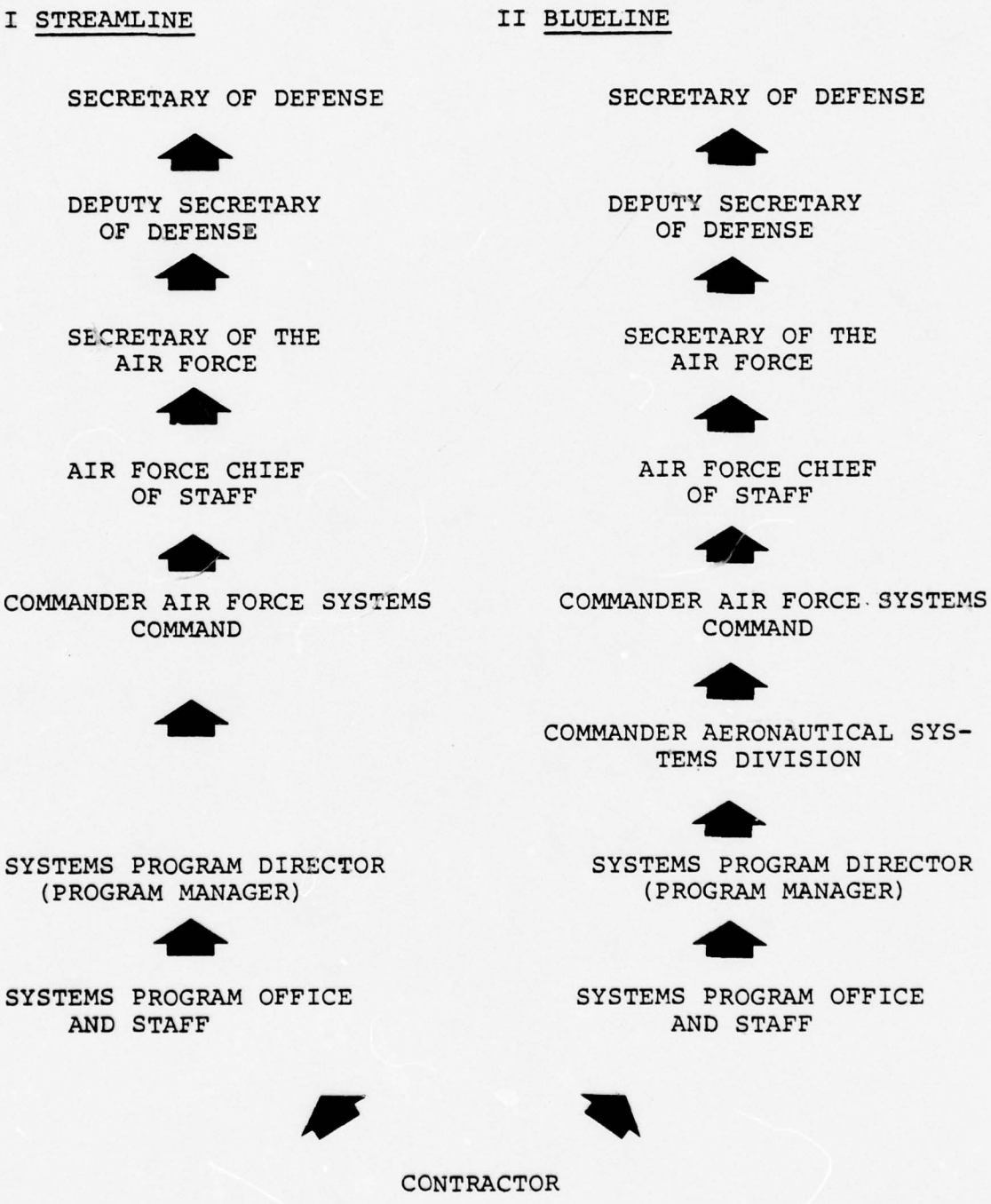
The Secretary of Defense and his office make most of the major decisions in aircraft acquisition. Number of aircraft to be procured, number each fiscal year and continuation, alteration or discontinuance of an aircraft acquisition program are generally the decision prerogatives retained by the SECDEF. The SECDEF makes most of those decisions through the DSARCS and by virtue of his position in the budgeting process. The Secretary of the Navy's position in the information flow is to filter out service prejudices and to ensure an Aircraft Acquisition is in tune with the Navy's strategy and will enhance its ability to meet the goals. The Chief of Naval Operations' primary concern is with the technical capabilities of the aircraft being procured ensuring it integrates into the force structure and can accomplish its programmed mission. The Chief of Naval Material is concerned mainly with cost control and achieving a timely delivery of the aircraft being procured. The Commander Naval Air Systems Command offers basically a support and evaluation role. With his resources he tries to ensure that the Program Manager is adequately prepared to carry out the acquisition process. The decisions he retains deal with how he will allocate his resources to the various aircraft acquisitions under his purview and are based on need and an evaluation of performance. The Project Manager of an Aircraft Acquisition in the Navy is tasked with making tradeoff decisions on cost, performance and delivery and is the general

manager of the Acquisition Process on a day-to-day basis from inception until the acquisition is complete.

Although there are many branches not officially depicted in the information flow, the management information system is structured to ensure all levels in the hierarchy receive adequate information. Care is taken to ensure the chain of command is properly exercised and bypassing a link in the chain is not tolerated. This policy is emphasized through performance reporting. The Project Manager's performance is evaluated and documented by the Commander Naval Air Systems Command. This practice of the Reporting Senior being the next one up in the chain strengthens the chain and helps ensure that the information flow is smooth and adequate. The chain of command described is the one utilized by the Navy throughout the entire life cycle of any aircraft acquisition.

The Air Force's approach to the information flow and the chain of command differs somewhat from the Navy. During an aircraft acquisition the Air Force will usually utilize two chains of command. These two chains are depicted and labeled on the following chart (Figure 3). Dual chains of command during an Aircraft Acquisition Life Cycle is a new procedure being tested by the Air Force with the F-15 acquisition. So far the Air Force feels it has been very successful. The philosophy resulted from communications problems experienced during the acquisition of the C-5A. The streamline chain of command and the corresponding management information system is employed from program initiation through deployment of the first few procurement lots. The streamlined concept seems to serve a more useful purpose during this, the most critical time of the Acquisition process. It allows quick and direct access by the Program Manager to higher levels without time-consuming stops at various staff echelons.

FIGURE 3


I STREAMLINE
SECRETARY OF DEFENSE
DEPUTY SECRETARY OF DEFENSE
SECRETARY OF THE AIR FORCE
AIR FORCE CHIEF OF STAFF
COMMANDER AIR FORCE SYSTEMS COMMAND
SYSTEMS PROGRAM DIRECTOR (PROGRAM MANAGER)
SYSTEMS PROGRAM OFFICE AND STAFF
II BLUELINE
SECRETARY OF DEFENSE
DEPUTY SECRETARY OF DEFENSE
SECRETARY OF THE AIR FORCE
AIR FORCE CHIEF OF STAFF
COMMANDER AIR FORCE SYSTEMS COMMAND
COMMANDER AERONAUTICAL SYSTEMS DIVISION
SYSTEMS PROGRAM DIRECTOR (PROGRAM MANAGER)
SYSTEMS PROGRAM OFFICE AND STAFF
CONTRACTOR

It provides a streamlined route from the System Program Director to the AFSC Commander and to the Air Force Secretarial level. This provides rapid information flow when waging the political battle and ensures quick reaction time for the Air Force Secretary when answering congressional questions. The decisions retained and the prerogatives exercised by the SECDEF and his office remain the same as discussed in Navy Aircraft Acquisition. Also the concern and position of the Air Force Secretary is the same as the Navy Secretary. The Air Force Chief of Staff integration and interaction in the chain is similar to that of the CNO in the Navy Process. The Commander Air Force Systems Command, under the Chief of Staff, is responsible for all acquisitions in the Air Force. Acquisition diversification for the Commander AFSC is much more limited than for the CNM due to the nature of the services missions and especially due to the generally one-faceted operational environment of the Air Force versus the three-faceted operational environment of the Navy. However, where CNM is responsible for only acquisitions the AFSC responsibility scope is broader. The Commander AFSC is also responsible for RDT&E (Research, Development, Test and Evaluation) a responsibility delegated to an office of the CNO, OP-98 in the Navy. In the streamlined mode of chain of command, the Commander AFSC is the Systems Program Director's (Program Manager) Reporting Senior. The Commander AFSC stresses cost control and timely delivery and also ensures that the

Systems Program Director has proper support. The Commander AFSC directs the Commander Aeronautical Systems Division to provide the support needed and, by surveillance and program evaluation, exercises his position of determining priority among Aircraft Acquisitions in Process.

The Blueline mode of information flow is usually employed through a majority of the late Production and Deployment Phase. It incorporates the Commander Aeronautical Systems Division into the command chain and he becomes the Reporting Senior of the Systems Program Director. It is felt that by the time the Blueline mode Chain of Command is utilized that the Aircraft Acquisition has reached a degree of stability, and immediate information flow especially to the Service Secretariat level is not as critical. Also the SPO is being drawn down somewhat and the need may arise to call on the ASD for functional expertise. The Aeronautical System Division in the Blueline mode functions much as the Naval Air Systems Command does in the Navy's Chain of Command. It provides support to bridge the gap between the technological base and satisfying the operational requirements through expertise in specialty fields of procurement, test, research, analysis, production and study all based on engineering and management support from various deputy organizations. Due to the structural organization of the Air Force's System Program Office, this specialty service is not utilized that much, and the primary function of ASD is the shifting of funds between Acquisitions where possible, and the evaluation

and progress monitoring of all the aircraft acquisitions reporting to the Commander Air Force Systems Command. The Aeronautical Systems Division is one of three product divisions of the Air Force Systems Command and is concerned with aeronautical systems, aircraft and air-launched missiles.

Thus the Navy feels a uniform information flow with one management information system servicing the Aircraft Acquisition from cradle to grave provides the best results for its needs. The Air Force on the other hand utilizes two Chains of Command during an Aircraft Acquisition Cycle seeing a need for a more streamlined responsive information flow in the earlier stages of the acquisition cycle. The organizational structure of the Air Force's System Program Office provides the flexibility to employ these two different command chains. The Air Force's System Program Office is organized as a self-contained entity staffed with sufficient personnel thus providing the prerogative of bypassing certain functional staffs with their available expertise.

To cite our specific examples the F-14 utilized the standard chain of command from inception to the present. The F-15 utilized the streamline command chain from inception until March of 1974 From March of 1974 to the present it has been functioning under the Blueline Command Chain. The Air Force is utilizing the concept of two command chains during an acquisition cycle on its B-1 and F-16 programs.

C. PROGRAM OFFICE ORGANIZATIONAL STRUCTURE

In Aircraft Acquisition in both the Air Force and the Navy the Program Manager is the individual responsible for managing all activities concerned with planning and executing the program. The ultimate success or failure of the Aircraft Acquisition is the responsibility of the Program Manager. The Program Manager's functional responsibilities in both services are the same and can be likened to top-level executives in any organization; that is planning, organizing, coordinating, controlling and directing. The structure of his office organization through which he executes these functional responsibilities represents the major difference in management approach to aircraft acquisition between the two services. As was previously stated there are three types of organizational structures utilized in Program Management offices. In Aircraft Acquisition the Navy utilizes the Matrix organizational structure while the Air Force employs the program organizational structure. [The terms Project and Program when dealing with aircraft acquisition are synonymous and term selection depends upon the user and his orientation.]

The Navy's philosophy in utilizing the Matrix Organization in Aircraft Acquisition lies in reaction, manpower shortages and maximum utilization of the valuable resource, expertise. A Project Office is created with a minimum staff. The staff is divided up in functional responsibility by division, with each division being responsible for a certain area of the

acquisition process. As the Division head perceives a need for analysis, study or detailed staff work,he draws upon existing staffs and specialists in other organizations (external to the Project Office) to accomplish the work. When the work is completed the specialty groups return to their parent organization. The nucleus and continuity lies in the 15-30 people typically permanently assigned to the Project Office. This concept allows the Project Office to be quickly created and staffed and involves very little phaseout when the acquisition draws to a close. The Matrix concept also facilitates quick reaction to any situation as it draws on already available and experienced talent. The Navy's diversification in hardware acquisition and the size of the acquisition process would very heavily tax its already critically short manpower resource if each acquisition office were staffed as a self-contained unit. By drawing personnel from specialty staffs as the need arises, conservation of a critical resource, manpower, is employed. The Matrix concept also reflects the attitude of maximum utilization of expertise. Specialists staffed in a Project Office would not be fully or continually utilized as the needs are not constant. However by being available to many acquisition processes their talents are continually on demand and their expertise is continually tasked. As with most any concept there are drawbacks. The most obvious ones in the Matrix organization are trading off some of the Project Manager's

responsibility and authority and having to prioritize the demand for the specialty staffs. Since these specialty staffs are not attached to the Project Office the Project Manager lacks the direct Chain of Command authority and the powerful influence this has over the specialty staffs. Also the demand for specialty staffs between acquisitions at times must be prioritized. In aircraft acquisition in the Navy this just necessitates the Commander Naval Air Systems Command exercising his responsibility and assigning priorities. To be more specific, if the need is perceived for technical help or engineering analysis in an Aircraft Acquisition in the Navy, the Project Manager will call on specialty staffs from NAVAIRSYSCOM primarily from the Office of the Assistant Commander for Logistics/Fleet Support (Air 04) or from the Office of the Assistant Commander for Material Acquisition (Air 05). If financial analysis is needed the Assistant for Financial Control within the Project Office will call upon the office of the NAVAIRSYSCOM Contracting Officer who usually coordinates his efforts with the Navy Plant Representative (NAVPRO) located at the contractor's facilities. Appendix B is an organizational chart of the F-14 Project Office and Appendix C is a breakdown of the people permanently assigned to the office by their rank/grade and area of expertise.

The Air Force Systems Program Office is a self-contained entity capable of acquiring an aircraft without external

assistance. When the Systems Program Office is established, it is permanently staffed for the duration of the acquisition with adequate subject matter expertise and specialist staffs required for program accomplishment. The System Program Office is broken up by functional responsibility into Divisions. The Air Force feels that this type of Program Office organizational structure enhances communications, coordination and control and emphasizes the Systems Program Officer's management responsibility and authority, and gives him wide latitude to manage his Program Office to meet the technical objectives of his program.[14]

The criticality and sensitivity of an aircraft acquisition necessitates the Program Manager having all the resources needed to adequately manage his program under his control. Having control and reporting authority over the Systems Program Office personnel reemphasizes the attention these individuals are required to give to their functional responsibility.

The program organizational structure also has its drawbacks. The time required for selection for staffing and the intricate process or phasing out the office at the end of the acquisition present problems. At times the staffed expertise level is marginal because of having to spread the expertise over all aircraft acquisition program offices.

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[14] Air Force Systems Command Pamphlet 800-3, 9 April 1976, pgs. 20-21.

The typical Systems Program Office for an aircraft acquisition will contain between 150 and 300 people. The typical Program Office structure and general divisions by functional responsibility for the Air Force are shown in Appendix D. To cite our specific example, the F-15 Systems Program Office organizational chart is contained in Appendix E. Appendix F is another organizational chart of the System Program Office for the F-15 with personnel authorized to each of the functional divisions. Appendix G is a breakdown of the personnel assigned to the F-15 Systems Program Office by Rank/Grade and by area of expertise.

In summary the Program Office in both services is a management organization responsible for ensuring that all participants perform their tasks during the various phases of a system acquisition program. The effectiveness of the Program Office is dependent upon the quality of performance of the assigned individuals whether they be permanent or temporary. The Program Offices are line elements of their parent organization. The Program Manager is the overall manager of all activities pertaining to his aircraft program. He establishes detailed objectives, guidelines and requirements for the participating organizations, and tasks them through the Program Office. If the Program Office fails, the Program Manager fails and the acquisition is a failure.

## D. ASSIGNMENT, TRAINING, EXPERIENCE AND EDUCATION OF PROGRAM MANAGEMENT PERSONNEL

This is the most controversial area in the Program Management concept. There is general unison as to the viability of the concept of the single manager with responsibility for an aircraft acquisition. The controversy arises when one talks about the personnel that are assigned to program management billets, their tour lengths, educational background, competence, experience and motivation. The criticality of Program Management necessitates highly qualified personnel in Program Management billets. Conversations with the Air Force Systems Command and the Naval Air Systems Command emphatically demonstrated the intense screening process involved to fill program management billets with quality personnel. Both services view program management billets as highly visible, demanding and career-enhancing.

The Process starts with the selection and assignment of a Program Manager. In the Air Force the selection process is done by the Air Force Systems Command and they state the criteria for selection as experience, performance and education weighted in that order. In the Air Force the Program Manager is generally of Flag Rank, typically a Brigadier General as in the case of the F-15, C-5 and B-1.

In the Navy, selection of the Program Manager is conducted by the Naval Air Systems Command, and they use the same criteria as the Air Force in their selection process, only

weighted in the order performance, experience and then education. The Program Manager can be either a Captain or of the Flag Rank, typically a Rear Admiral depending upon the complexity and visibility of the Program. For example, the F-14 Project Manager is a Rear Admiral, while the Project Managers for the E-2C and the S-3A are both Captains.

An interesting difference was noted when investigating the F-14 and F-15 programs that the author was unable to substantiate as a generalized aircraft acquisition approach difference between the two services. The Systems Program Directors for the F-15 Program had all had some prior aircraft acquisition experience. This was not found to be the case for the F-14 Project Managers as two had had prior aircraft acquisition experience and two had not.

Once a Program Manager is selected, approved and assigned, he then actively participates in the selection of personnel both military and civilian to staff his Program Office. The author found that the Navy's Project Manager had greater control over the selection process than did the Air Force's Systems Program Director. The difference is directly attributable to the size of the two staffs involved and when narrowed to key staff personnel selection, both Program Officers were found to be extremely influential in the selection process. Another point of interest is that in both services the Program Manager's influence in staff selection seems to dwindle as the Acquisition progresses through its cycle with the most influence existing in initial office construction.

Another major difference arises between the services' management techniques when one examines length of duty tours in program management billets. The Air Force has a stabilized four-year duty tour in a project management billet with selected key billets being extended to five years. This stabilized four-year tour for its military personnel is standard for two-thirds of the acquisition cycle and in the last one-third of the acquisition cycle the tour will revert to three years. The Navy on the other hand maintains a fairly constant 30-36 month tour of duty posture in its military program management billets. Exceptions will arise but these are on a case-to-case basis and are not the norm. As an example, the F-14 and F-15 initial Program Managers were selected and assigned within one year of each other-- the F-14 in 1968 and the F-15 in 1969. Brigadier General Scurlock was recently assigned as the third Systems Program Director for the F-15 program. Rear Admiral Alvis is presently the fourth Project Manager for the F-14 program and is due for rotation within the year.

The reasoning behind this difference in tour length is hard to pinpoint and substantiate. The following theory is that of the author and is based on perceptions gained from conversations with personnel in the F-14 and F-15 Program Offices. The Navy's view is that a normal duty tour consistent with those in other areas maintains a stable career pattern. It also feels that if rotation is

accomplished at other than a critical time in the acquisition process and a proper turnover is conducted continuity is maintained. Program Management billets are usually pressure billets where an individual can easily experience severe frustration. By utilizing a normal duty tour it is felt a higher level of motivation can be maintained and that the infusion of new talent into the program every 30-36 months is beneficial to the Program. The Air Force on the other hand views continuity as a key in its billet rotation. The general feeling is that one does not become effective or productive in a Program Management billet until he has about one year's experience. By utilizing a longer tour of duty, individual output is increased and a higher degree of continuity maintained.

In reality, continuity and experience in the Program Management Office is provided by the civilian personnel on the staff. They are generally attached to the program office for a longer period of time, some for the entire program duration. In the F-14 Project Office six of the civilians attached had been with the program since its inception and in the F-15 Systems Program Office 32 of the civilians attached had been with the program since its inception. Although these civilian personnel occupy key positions, they are not generally responsible for major decisions. This usually rests with the military managers. Good judgment in these major decisions typically is the result of years of experience and training in the fields of technical

performance, and business and financial management. This is readily evident if one were to parallel Program Managers in civilian industry versus Defense Acquisition. Key decisions in the civilian industry are typically made by individuals with years of experience and accumulated expertise. Presently this is not the case in Defense Aircraft Acquisition. Career patterns and duty tours prohibit the military program manager from building the experience and expertise so essential. Lack of experience is a readily acknowledged inequity and detriment to the Aircraft Acquisition Process by both the Navy and the Air Force.

The two services have tried to compensate for this experience inequity, somewhat, through education. A greater percentage of those personnel being assigned to Program Management Offices now have B.S./B.A. and Advanced Degrees. As a comparison, in a Report of the Long-Range Logistics Manpower Policy Board of February 1969 published by the Office of Assistant Secretary of Defense (Installations and Logistics) it was stated that 38% of the 06 and above ranks in acquisition held advanced degrees. Presently in Acquisition billets over 76% of the 06 and above ranks hold advanced degrees.[15] The Navy and the Air Force have both created acquisition curricula at their Advanced Degree Service Schools. Both curricula have been established within the last five years and the objective

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[15]Telephone conversation with Office of Assistant Secretary of Defense (Installations and Logistics) - Procurement.

is not to try to catch up but to prepare for the future. The Services have admitted their deficiencies and will accept them for the present, but by providing advanced degree acquisition education to Junior Grade Officers now, they hope to eliminate this deficiency in the near future. The officer graduates of these advanced degree acquisition programs are also being considered to have a specialty and are being utilized in that specialty as a Junior Officer. This will help eliminate the experiecne deficiency by preparing them for Program Manager jobs in the future. All Program Managers in aircraft acquisition programs in both services are now required to be graduates of the DoD-sponsored Defense Systems Management College located at Fort Belvoir, Virginia. This requirement will be considered satisfied if the prospective Program Manager is a graduate of the acquisition programs of the Air Force Institute of Technology or the Naval Postgraduate School.

The major difference between the two services lies in the area of emphasis in their acquisition education programs. The Air Force is almost totally technically oriented. They feel that all officers are by maturation managers, but to be successful in acquisition programs, need to develop an extensive technical background.

The curriculum at the Air Force Institute of Technology is structured to provide the needed technical background. The Navy on the other hand structures its curriculum to produce a

jack-of-all-trades. The acquisition curriculum contains technically-oriented courses but it also contains courses in financial management, organizational development and communication and management information systems. The Navy feels its acquisition curriculum graduates should have the knowledge to know the technical objectives, plans and problems, the test plans and status; the integrated logistics support plans, the financial status, the terms of the contracts; the configuration management controls and production scheduling, flow and delivery techniques if they are to be competent acquisition managers.

Educational opportunities are being opened up to government civilian procurement personnel also. The need to upgrade the civilian procurement personnel's educational level is obvious and both services are working in conjunction with the Civil Service Commission to try to rectify a very serious condition which is especially evident when one reflects on the roles these civilian personnel play in the acquisition process.

Appendixes H and I represent the educational background of the personnel assigned to the F-14 Project Office and the F-15 Systems Program Office. The figures are not "double-counted" and it is interesting to note the high concentration of master's degree in management in the F-15 System Program Office despite the technical orientation of their acquisition programs. The

percentage of people attached to the two offices with either a bachelors or masters degree is similar, with the F-15 having 72% and the F-14 being 70%. In comparing percentages of office personnel having masters degrees the Navy has 43% while the Air Force has 39%. In comparing management versus engineering we find the Air Force's F-15 office having 49% of its personnel holding degrees in management and 24% holding degrees in engineering. In the F-14 Project office 18% of personnel assigned hold management degrees while 53% hold engineering degrees.

E. PMP - PREPARATION AND USE

PMP is an abbreviation used by both the Navy and the Air Force that identifies two different documents that do the same thing. In the Navy PMP stands for Project Master Plan. In the Air Force PMP stands for Program Management Plan. In essence they both are documents describing the strategy the Program Manager adapts in managing his aircraft acquisition.

After observing civilian industry and through experience the need for a thorough coordinated and well documented plan for managing aircraft acquisition programs became evident. The PMP was established in both services. This plan provides the method of operation, tasking and responsibilities of the divisions in the Program Office. It should be tailored to provide the minimum essential information needed to outline the overall management plan for the program. It is a compilation of

all planning documents which places in context the plans, schedules, costs and scope of all work and resources to be provided by each participating organization. It deals with program management, logistics, manpower and organization, personnel training, test and evaluation, system engineering, intelligence, communications and Program summary and authorization. In short the PMP defines the Program Manager's management approach for acquiring a system and provides a guide and a checklist for the Program Manager to execute his responsibilities and evaluate his progress.

Although the basic concept of the PMP is the same in both services, its creation, issuance and approval are different. In the Navy, NAVMATINST 5200.11A specifies that the PMP will be prepared by the Program Manager as his initial task once assigned. The Project Manager's only guidance is that the document should provide uniform direction for work planning and scheduling and provide basic documentation which coordinates effort for his project. Once prepared it is submitted to the Commander Naval Air Systems Command for review, approval and issuance. It is issued in entirety and revised annually or whenever a significant change occurs in the status of the acquisition. Even though the PMP is prepared by the PM it bears the Commander Naval Air Systems Command signature. In the Air Force the Program Manager is given specific details and guidelines as to what the PMP should contain. This is provided by

the Program Management Directive (PMD). Although the PMD has been cited before in discussing the creation of the Program Office, further amplification is appropriate. The PMD is the official Headquarters United States Air Force management directive used to provide program direction to Air Force Systems Command and the Program Manager. The PMD will define the responsibilities of the participating commands, state requirements, initiate, approve, change, modify or terminate programs. It parallels the Navy's charter in context. The PMD will be supplemented by the Air Force Systems Command Form 56, the official AFSC management document providing program direction to the Program Managers. Armed with the PMD and AFSC Form 56, the Program Management Plan will be developed and issued by the Program Manager. The PMP is the principal management baseline document for the program and the Program Manager is his own approving authority as to the PMP's context. The PMP should reflect the integrated time-phased tasks and resources required to accomplish the task specified in the PMD supplemented by AFSC Form 56, but the Program Manager approves it and a copy is furnished to higher authority simply for information. The PMP is usually issued incrementally rather than in entirety in the Air Force. The Program Managers issue only that portion he deems necessary for that specified period. Whether issued incrementally or in entirety, the PMP is updated as deemed necessary by the Program Manager and is not tied to an annual revision.

Good management technique dictates that the manager have a plan that states goals and objectives and a strategy that delineates means of achieving them. The PMP provides this management tool for both services in Aircraft Acquisition Management. It is the program management nucleus in aircraft acquisition for the PM and his Office.

F. DSARC PREPARATION AND DCP CONSTRUCTION

The DSARC and its function have been previously mentioned. This section will attempt to emphasize its importance and describe the differences in DSARC preparation and DCP construction between the Air Force and the Navy.

The review conducted by the Defense Systems Acquisition Review Council (DSARC) at key system decision points in the aircraft acquisition process is held for the purpose of ensuring that the service has a viable program and is ready to proceed to the next phase of acquisition. It is the responsibility of the Program Manager to provide the DSARC with the pertinent information it needs to make its recommendations regarding the program to the Deputy Secretary of Defense (DEPSECDEF). The DEPSECDEF then makes the key system decision (proceed, modify, or cancel) based in part on the DSARC's recommendation. This high-level decision hinges on the effective, impressive and knowledgeable presentation by the Program Manager. He must use all the facilities and management expertise available to him to prepare for the DSARC. The Program Manager is in

competition with other Programs for the scarce resource, funds. All Programs are considered essential for National Defense and the DSARC provides the function of prioritizing the Programs within the Department of Defense. The very existence of an aircraft acquisition program can depend upon the Program Manager's presentation. Personally, a Program Manager strives to succeed to enhance career possibilities.

The two basic differences between the Navy and the Air Force in DSARC preparation are: (1) The Air Force has developed an extensive technically oriented checklist for use by their Program Managers in preparation for a DSARC review while the Navy has no such "cook-book" type of checklist; (2) The Navy has an extensive pre-review process while the Air Force utilizes just two pre-reviews.

The Air Force feels a standardized checklist provides uniformity and standardization to the preparation procedure. It ensures that all major areas are covered and assists in formatting the technical areas of the Program that experience has proven are considered most important by the DSARC. The Navy does not use an official checklist because it considers the interface between the Project Manager, NAVAIRSYSCOM and the Naval Material Command, coupled with the pre-DSARC reviews, to be sufficient. The Navy feels flexibility is the key to adequate DSARC presentation. It is felt that a DSARC's interests vary depending upon the program and, by obligating the Project

Manager to a standardized checklist, you remove the individuality needed for each DSARC presentation.

The pre-DSARC review is a concept used by both services. It allows senior service personnel, who have been involved in previous DSARCs, to critique the Program Manager's presentation after he and his office have prepared and polished it. The number of these reviews is the primary difference between the Navy and the Air Force. The Air Force conducts just two reviews prior to the actual DSARC: (1) Air Staff Review chaired by the Deputy Chief of Staff (R&D) and (2) Joint Secretary of Air Force and Chief of Staff of the Air Force Review. The Air Force feels that standardized preparation necessitates only these two pre-reviews. The number of pre-reviews in the Navy is not standardized and varies but is always in excess of two. Sometimes more than one pre-review at every echelon in the Command Chain is held. The Navy realizes that these reviews put heavy demands on the Program Manager's time, but they tend to better service credibility at the DSARC because reiterations improve the presentation.

The Decision Coordination Paper (DCP) is the official document that supports the Program Manager at the DSARC and from which he draws out the points to be made in his presentation. It defines program issues, including: special logistics problems; program objectives; program plans; performance parameters; areas of major risk; system alternatives and

aircraft acquisition strategy. It allows the DSARC an in-depth look at all program factors before financial resources are heavily committed to the program. After the DSARC's review and the DEPSECDEF's decision, the DCP becomes a form of contract between the service and OSD relating to the future conduct of the aircraft acquisition program.

There is a significant difference between the Air Force and the Navy in the way they construct a DCP for DSARC review on an aircraft acquisition program. The Air Force has a standard checklist of 18 items that it uses in formulating its DCP.[16] The DCP is complete and officially signed, usually by the Commander Air Force Systems Command prior to the DSARC.

The Navy does not utilize a standard checklist in constructing its DCP and many times enters into DSARC review prior to completion and review of its program's DCP. The Navy justifies this with the argument that prior to the DSARC review, resolution of major issues is not complete and the final DCP cannot be consummated until resolution of these issues. Further, the Navy contends that a non-finalized DCP provides the DSARC more flexibility regarding its recommendation to DEPSECDEF. At the DSARC review new alternatives can be proposed as a result of the meaningful interchange between the service and the DSARC principals. The changes can be entered in the DCP and significant coordination time can be saved.

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[16]Air Force Systems Command Pamphlet 800-3, 9 April 1976, pps. AI-2-AI-3.

Regardless of the differences in formalizing the DCP and preparing for DSARC review, both services agree on one key point. If the program manager is to give an effective DSARC presentation and expect approval of his DCP he must be prepared to cope with opposition to his basic assumptions at all times. He should carefully consider all contingencies and be prepared to counter opposition to all areas of controversy.

DSARC preparation and DCP formulation is done internally in the Program Office in both services with staff service being provided by NAVAIRSYSCOM for the Navy's Project Office. Both services also conduct extensive liaison with OSD in preparing for the DSARC and in constructing the DCP.

G. TRAINING AND LOGISTICS

Besides direct acquisition of the aircraft, there are two other areas in which a Program Manager has responsibility. Historically these have been very weak areas in the total program concept. The Program Manager gets so involved in the Aircraft Acquisition Process itself that he at times seems to forget that he is also responsible for developing an integrated logistics system to support the aircraft when deployed and for ensuring adequately trained personnel are available to operate and maintain the aircraft in a deployed status. These have been sorely neglected facets of the acquisition process and a major effort is underway to upgrade this aspect in both services. Both services will readily admit that if tradeoff decisions were necessitated in aircraft acquisition programs and internal

reprogramming of funds took place the money supposedly dedicated to the logistics of the aircraft is the first to be drawn from. In such cases an aircraft is deployed without adequate spares resulting in such consequences as 20% availability on the Navy's S-3 and 34% availability on the Air Force's C-5. Paralleling this is the essential need for personnel development programs, both in the Air Force and Navy. The way these two functions are handled by the Program Manager through his office offers an interesting contrast in approach.

In personnel development programs for new aircraft systems, the Navy is guided by BuPersInst 5400.2, which directs that a Project Manager is responsible for the development of personnel requirements and ultimately adequate manning for the Weapon System Acquisition that he is managing. This function is assigned by the Project Manager to his Training Officer, usually a Navy Commander. The Training Officer must rely completely on specialty staffs entirely outside the Acquisition Command Chain. Liaison is conducted with the Bureau of Naval Personnel and, through the Bureau, the Training Device Center at Orlando, Florida, to ensure adequate manning and training plans are developed. This includes personnel assignment and the design of maintenance schools and curriculums to ensure the availability of an adequate level of technical expertise. Working through OP-05 and the Bureau, the Training Officer ensures the development of crew training programs. All of this is done external

to the Project Office and is monitored by the Training Officer who reports progress to the Project Manager.

The Air Force's concept is a bit different in the training area. The Air Training Command is the Air Force's functional organization responsible for training concepts, training plans, trained personnel requirements, individual training (initial and replacement). This command has established a resident Training Command Office at the Aeronautical Systems Division which comes under the responsibility of the Commander Aeronautical Systems Division. [The Commander ASD is the Reporting Senior for the people attached to this resident ATC Office.] This office is thus in the Acquisition Command Chain and supports the various System Program Offices. It develops and provides all the training concepts and plans for the Aircraft Systems, the trained people and the training facilities, as well as assisting in the acquisition of much of the training equipment for both maintenance personnel and operators.

The Integrated Logistics Support Program in either service's aircraft acquisition cycle consists of logistic concepts, logistics plans, material support plans, test support equipment, medical services, warehousing maintenance (Depot level), maintenance (Field level), and distribution systems. What this reduces to is ensuring that spares, tools and equipment to fix parts, and ground support equipment are available when the aircraft is made operational.

In both the Air Force and the Navy there is a functional division in the Program Office responsible for Integrated Logistics Support. In both services this office branch is headed by an 0-5. The similarity ends here, however. The Navy Integrated Logistics Support Program is headed by the Project Office Branch head but the actual program development is done by the Office of the Assistant Commander for Logistics/ Fleet Support in NAVAIRSYSCOM. The Air Force, on the other hand will establish a Program Cadre in the Systems Program Office of people from the Air Force Logistics Command (AFLC), which is a command that is not in the Acquisition Command chain. The entire Logistics Support Program is developed entirely within the System Program Office by AFLC people who are responsible to the Program Manager. The guiding directive for both services in the area of Integrated Logistic Support is DoD Directive 4100.35.

## H. USER REPRESENTATION AND COMMUNITY RELATIONS

The Air Force employs a unique concept by having a Using Command Representative attached to the Systems Program Office. This face-to-face liaison between the Program Manager and the User's representative has been felt to be extremely beneficial by the Air Force. This Using Command representative assures that, as the ultimate customer, its true requirements are continuously reflected in the systems planning and actions

during acquisition. The influence of the Using Command representatives is essential during the early part of the System Life Cycle. Although this representation is more of a liaison nature than a direct large-scale participation, experience proves that their presence provides insurance that the Using Command's desires and requirements are carefully considered especially during the validation phase.

The Navy does not utilize this Using Command Project Office Representative Concept. It does, however, conduct liaison by message traffic and phone to the aircraft's eventual users to ensure their inputs are filtered into the program.

In the Continental United States, the Air Force's Program Manager has the responsibility for ensuring that the local community is prepared for the deployment of the aircraft and for maintaining the goodwill of the local citizens throughout the activation program.

The Navy tasks the Using Command and Base Commanders with this Community Relations function when in CONUS.

In overseas operations, the State Department, or Foreign Government involved have the authority and the organization to carry out the Community Relations program. The Program Manager in both services must support the public relations program by providing films, informational material, and so forth, and ensuring that remedial action is taken immediately upon the occurrence of any adverse incident under his responsibility.

## I. ON-SITE DIRECT REPRESENTATION

An interesting area of difference in aircraft acquisition strategy between the two services centers on an issue that has been controversial since the Program Management Concept's inception, this being whether or not a representative from the Program Management Office should be located at the contractor's primary facilities to provide on-site representation.

The Air Force in 1974 withdrew its F-15 Systems Program Office representative from the McDonnell Douglas production plant. The Air Force feels that the liaison existing between the Program Office and the Air Force Plant Representative Office (AFPRO) which is permanently located at the McDonnell Douglas facilities satisfied any representation need that the Program Office had. In a discussion with the F-15 Systems Program Office the attitude exhibited was that any representation that was needed on-site between the Program Office and the contractor could be satisfactorily handled through the intermediary AFPRO. The F-15 Systems Program Office had not experienced any difficulties in utilizing the AFPRO even though they are not part of the Program Command Chain. It was felt that duplication of effort and waste of a valuable resource, talented manpower, were resulting from the direct representative concept. The Air Force is presently not employing an on-site program office representative in the acquisition of the B-1 or the F-16.

In contrast, in 1973 the Navy felt that substantial benefits could be gained if a Program Office representative was assigned

on-site. This was a new concept for the Navy and basically is in a trial stage with the F-14 program. The reason for this move had nothing to do with the ability of the Navy Plant Representative Office (NAVPRO) in providing liaison with the contractor. The NAVPRO's interests at Grumman were more diversified than just monitoring the F-14 Program (Grumman also produces components for missiles, produces the E-2C, the A-6 and the E-A6) and they were unable to give the F-14 program their complete attention during a very critical time in the Acquisition Cycle. Consequently a Commander was attached to the NAVPRO Office at Grumman's Bethpage facilities who is directly responsible to the F-14 Program Manager. In conversations with the F-14 Project Office I found the attitude to be extremely favorable to this arrangement especially considering the problems Grumman faced in the F-14 production. The basic concept has been very beneficial and a Project Office Representative on-site will be utilized in the F-18 program.

## J. GEOGRAPHICAL DISPERSION

In aircraft acquisition there is no geographical dispersion in the command responsibility line in the Navy, while the Air Force experiences geographical dispersion. The Chain of Command for the two services in aircraft acquisition has been discussed. In the Navy, the Office of Chief of Naval Material, the Office of the Commander Naval Air Systems Command and the Project

Manager's Office with all their supporting functional staffs are located in Crystal City, Arlington, Virginia. The Project Manager and the Commander Naval Air Systems Command are in the same building complex and within walking distance of the Office and support complex for the Chief of Naval Material. Crystal City is approximately two miles south of the Pentagon which provides ease of accessability to the CNO, the Secretary of the Navy and the Secretary of Defense and their offices. This arrangement pools the various echelon resources, provides almost immediate face to face contact between members of the Command Chain and facilitates program presentation to the holder of the purse strings, Congress. This can be an asset in the acquisitions' never-ending political battle. A majority of the major consulting firms utilized by the Department of Defense are also located near the Crystal City area and this enhances response time to the Navy's needs in its Aircraft Acquisition Process.

The Air Force, on the other hand, finds its Aircraft Acquisition Command Chain geographically dispersed. The Commander, Air Force Systems Command headquarters is located at Andrews Air Force Base, outside Washington. It is approximately twelve miles east of the Pentagon, where the Air Force Chief of Staff, Secretary of the Air Force and the Secretary of Defense and their offices are located. The Commander, Aeronautical Systems Division and the Program Manager and their offices and

functional staffs are located at Wright-Patterson Air Force Base, Ohio. In talking with representatives from the F-15 Systems Program Office, I found the attitude to be generally favorable to this arrangement. The isolation and shielding this geographical dispersion provided the Systems Program Office greatly reduced the time spent responding to inquiries on a face to face basis, lessened, to a degree, external interference and allowed the Systems Program Office to concentrate on their primary job of managing the Aircraft Acquisition Process.

## K. FINANCIAL MANAGEMENT

In comparing the two services' approaches and techniques in the area of financial management the only real distinguishable difference revolved around the staff work provided by the NAVAIRSYSCOM Comptroller and Contracts Office in helping the Navy's Program Manager in budget formulation and execution. This is handled exclusively within the office in an Air Force Systems Program Office. However, the author feels that the area is of such importance and has such grave consequences that a discussion of financial management in Aircraft Acquisition is fundamental to understanding the Acquisition Process.

Of the last ten airplanes produced for the government by the aircraft industry, cost overrun has averaged 13 percent

over ceiling price.[17] This only includes aircraft whose production runs are complete and the ceiling price was adjusted for inflation. Cost changes for aircraft acquisitions can be basically broken down in the following way:

25% - comes from inaccuracy in cost and performance estimating on the part of DoD and the Contractor.

30% - inflation.

45% - specification changes. This includes time schedules, quantities or engineering changes. Much of this type of cost growth results from unrealistic performance targets at the outset and trying to develop and produce the system too fast.[18]

In talks with the F-14 and F-15 Program Offices, the following became readily evident. A proper budget preparation and execution with the prevention of cost overruns are significant in deciding whether an aircraft acquisition is tagged a success or a failure. Public and Congressional pressure truly dictate policy on this issue and have put the Program Managers in a defensive situation which influences tradeoffs. They are forced to manage and evaluate on the basis of cost control with other measures of efficiency and effectiveness taking a back seat.

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[17] "Why Military Airplanes Cost So Much and What Can Be Done About It," Air University Review, November-December, 1973, pp. 94-100.

[18] Webb, Donald E., Thesis--The Study of Cost Growth of a Major Weapon System, December 1974.

In essence there are really two parallel decision cycles that any aircraft acquisition is constantly involved in. These two parallel decision cycles are the Fiscal Cycle which is passed through each year; and the other is the Life Cycle which is passed through just once. While these cycles do run in parallel, they do interact and can radically affect one another. The Life Cycle is the time it takes a program to go from basic research and a gleam in someone's eye, through development, production and deployment. The Fiscal Cycle is the annual planning, programming, budgeting, and enactment and apportionment activity. Major decisions in the Life Cycle of an aircraft acquisition have already been discussed. Key decisions in the Fiscal Cycle would be DoD and the involved service planning and funding and finally the most crucial decision in the acquisition program: will Congress appropriate funds for the program and to what degree? In reality all other decisions in either cycle are based on Congressional funding.

The Program Manager is really the Commanding Officer of his Program tasked with yearly budget formulation, projection of long-range needs for his program, including entire life cycle costs, executing his budget and especially maintaining costs within the approved budget. To be competent in his Financial Management responsibility, a Program Manager must understand PPBS, the FYDP, appropriations, apportionments,

operating budgets, costing techniques, intricacies of financial analysis, details of progress payments and he must have at his disposal individuals who can work in these critical areas to ensure resource control. This is imperative if a Program Manager is to keep his program competitive for scarce resources. Congress carries the power of the purse strings and if a Program Manager is not accurate and credible in his budget formualtion and execution it can destroy the Program.

In 1972 the Navy added an Assistant for Financial Control to their Aircraft Project Offices. He is responsible to the Deputy for control and assists and advises in all the financial management areas previously mentioned. The Air Force has a Resources Management Division in their Systems Program Office which is tasked with financial management responsibility and has been so incorporated in Systems Program Offices since 1971.

The need for sound financial management in aircraft acquisitions is paramount. Again both services admit the expertise and experience are lacking. Individuals are being prepared for this financial management responsibility and are being designated as specialists but the need for them is so great in all areas of service operation that many times the Aircraft Acquisitions Programs receive low priority for this expertise. In an attempt to counter this and provide the expertise so critically needed, the Department of Defense has originated an Industry Financial Management Course for Program Managers at the

Defense Systems Management College at Fort Belvoir, Virginia. Not only Program Managers, but office staff, are being schooled here and the present thinking in both services is to try to build an expertise level in the civilian acquisition personnel especially since they provide the continuity in an aircraft acquisition program.

## L. PROGRAM MANAGEMENT RESPONSIBILITY TRANSFER AND TURNOVER

One of the major differences in Aircraft Acquisition Management occurs toward the end of the acquisition cycle.

In the Navy's Aircraft Acquisition philosophy, the Program Manager manages the acquisition program until the last aircraft rolls off the production line and has been delivered, along with all its supporting equipment. At this time the Project Office charter expires, the Office is disbanded and people reassigned. Control and responsibility for the aircraft is then the purview of OPNAV which filters down the command chain with fleet aircraft ownership usually resting with COMNAVAIRPAC or COMNAVAIRLANT.

The Air Force approach is radically different. The Program Manager under the Air Force Systems Command has program management responsibility up to the production phase of the program. Sometime during the production phase responsibility for the aircraft acquisition program management is transferred to the Air Force Logistics Command. This transfer is aptly named Program Management Responsibility Transfer (PMRT). The

PMRT date is a calendar date that is negotiated between AFSC and AFLC and is selected based upon particular program needs, criticality, with the full intent to effect PMRT as early as possible. Immediately following the approval of full scale development Transfer Working Groups (TWG) are formed to assist in the selection of the PMRT date and in the planning and implementation of PMRT. The TWG includes representatives from AFSC, AFLC and other involved commands. The Group is charged with planning and implementing a fully-coordinated, orderly, timely and efficient sequence of events leading to a successful PMRT.

Headquarters USAF approves the PMRT date and AFSC and AFLC must jointly review the program management responsibilities far enough in advance to accommodate PMRT and the Planning, Programming and Budgeting Cycle to ensure consideration of funding requirements for all tasks. Systems Program Office phaseout is also coordinated around PMRT with specific negotiated divisions of the office remaining intact, tracking post-PMRT residual tasks performed by the Program Manager until they are completed. The ultimate responsibility for PMRT planning lies with the Program Manager.

The reasoning behind this approach is rather simple. Delivery and support of the aircraft is a logistics function and more easily handled by the Air Force Logistics Command.

Turnover, of course, is the point when the operating command formally accepts responsibility from the implementing command for the operation and maintenance of the aircraft. This quite naturally takes place between the AFLC and the TAC command receiving the aircraft. To cite a specific example, the F-15 program anticipates PMRT in 1980 immediately after the last lot is procured with turnover occurring in late 1982. The Navy's F-14 Project Office will manage the F-14 Program up to the point of turnover which is presently scheduled for late in 1979.

## IV. SIMILARITIES

Although the major topic of this thesis is differences in Aircraft Acquisition Management between the Air Force and the Navy, it is appropriate to include a brief discussion of the similarities, for they by far outnumber and overshadow the differences.

The similarities, of course, arise from a common boss, the Secretary of Defense and DoD Directives govern a majority of the acquisition techniques and practices employed by the services. A listing of the ones considered major might help in understanding the complicated world of Aircraft Acquisition.

1. Program Manager - Individual with centralized authority and responsibility for entire Acquisition Management.

2. Command Chain - Similar in structure and organizational function.

3. Contracts - cost plus for R&D and fixed-price incentives for production.

4. Payments - done by Progress Payment Method.

5. Total Package Procurement - eliminated - F-14 and F-15 last aircraft acquisition in both services to employ this concept.

6. Fly-before-buy - utilized. F-14 and F-15 first aircraft acquisitions for each service to use this concept.

7. Historical Costing - eliminated.

8. Should Cost Analysis - employed.

9. Design to Cost - employed. F-14 and F-15 first aircraft acquisitions in each service to utilize design to cost methods.

10. PERT, CPM and CER - utilized.

11. PPBS - employed.

12. Operating Budgets - Each aircraft acquisition in either service has its own operating budget and the Program Manager has RS 3679 responsibility.

13. Utilization of Consulting Firms - done by both services especially to provide business expertise.

14. Computerized Management Information Systems - utilized and almost identical in structure.

15. Cost Control - driving force in the Acquisition Management.

These are a few of the major management concepts and techniques utilized in aircraft acquisition that were not mentioned extensively in the context of this thesis and may have left the reader unsure of their integration. It suffices to say that they are an extremely important part of aircraft acquisition management and were not mentioned because of their similarity in use between the two services.

## V. PROBLEM AREAS AND AVENUES OF SOLUTION IN THE F-14 AND F-15 PROGRAMS

The F-14 and F-15 System Program Goals were almost identical in nature and can be generally summarized by the following statement: "Produce and deliver the air superiority fighter within the approved program which delineates cost, schedule and technical performance parameters." Both services have done very well in meeting planned program schedule and technical performance parameters but have experienced difficulties in maintaining original program cost parameters. Many reasons have been proposed as to why the biggest management headache for an aircraft acquisition program manager is cost control. Fluctuating economy, inflation, uncertainty in the financial environment, poor management practices, paternalism, overoptimism by the service and contractor, "buying-in," and historical costing techniques have been a few of the major reasons that have been offered. The answer may lie in one or maybe all of these reasons and concepts have been developed to try to

counter cost overruns and exhibit better cost control. Regardless of the reasons, or the formulated answer to these reasons, cost control historically has been, presently is, and I predict will be the major problem area in aircraft acquisition. Perhaps there is no answer or there are so many factors operating that the process is beyond human control. The F-14 and F-15 programs were no exceptions to the established trends and saw cost control as the biggest management challenge.

The F-14 Program experienced severe problems revolving around contractor financing from the period of late 1971 to the fall of 1974. Before the actual problem and its resolution are discussed, I would like to reflect on some conversations with the F-14 Project Office on the problem that may help to lend insight. The Project Office foresaw the problem before it reached "crisis" level but were almost totally helpless to do anything about it. The Project Office felt Grumman had perhaps been overoptimistic in their cost estimates for the production lots contract and perhaps had even engaged in "buying-in." The Project Office was unable to control other areas of Grumman business strategy not related to the F-14 program contract and when the problem finally surfaced in sufficient magnitude to warrant top-level attention, the Project Office and the Navy were forced into a defensive posture and had to resort to a common but not recommended management technique

known as "crisis management." The Project Office felt extreme frustration.

On 31 March 1971, Grumman first formally asserted that economic factors beyond their control, inflation and loss of projected business, made performance of Lots IV through VIII commercially impractical. The Navy investigated and concluded that inflation and loss of business were causing increased costs. It was also determined that Grumman delays in getting their subcontractors and vendors on contract and Grumman directed changes had also caused significant cost increases. It was further determined that Navy program costs would be lower if the tightly priced contract could be preserved, despite Grumman's loss forecast, which, it was recognized, could worsen upon further loss or failure to make significant retrenchments. It was also determined that Grumman could perform the Lot IV option for 48 aircraft unimpaired. More serious financial problems were foreseen in the performance of Lots V through VIII.

As a result of the Defense Systems Acquisition Review of June 1971, DEPSECDEF approved a restructured production program for procurement of 301 aircraft. On 27 July 1971, Grumman formally advised the Navy they would perform Lot IV and on 30 September 1971, the LOT IV option for 48 aircraft was exercised.

In January of 1972 Grumman announced an estimated loss of $111,000,000 on the F-14 airplanes for Lots I through IV. This

loss was offset by profit of $46,000,000 on F-14 spares, support and R&D effort. On 20 January 1972, Grumman informed the Navy by letter that the Navy's further options were considered invalid, further option exercises could not be accepted, the company would build further aircraft at negotiated fair prices, but that the contract would require restructuring.

During March and April of 1972, the Senate Armed Services Committee held hearings exploring program status, Navy and Grumman positions, and the financial impact on Grumman of completing the 313 airplane program. The Navy asserted in Congressional testimony that there was a valid contract, but that more substantive cost data was required for a firm decision concerning future options. The Navy's basic position was to protect the Government's interest while proposing a course of action that would insure a viable program. Grumman claimed it could not perform Lot V citing inflation, loss of business base and the inability to acquire further commercial credit. Grumman stated it was left with no alternative but to reject the Lot V option.

On 28 April 1972, Grumman, faced with no available commercial credit, requested increased progress payments from the normal 80% to 90 or 100% to keep production moving. The Navy concluded that advance payments under 10 U.S. Code 2307 were the best way to assist Grumman with required financing. On 8 August 1972, for the first time in the Navy's Aircraft

Acquisition history, an advance payments agreement was executed which was initially limited to $20,000,000. Advance payments were increased by $16,000,000 on 15 September and by $18,000,000 on 28 December. Advance procurement funds were released in accordance with contract modification and without prejudice to either parties' position regarding validity of the option.

On 26 September 1972, Public Law 92-436 authorized the FY 1973 DoD appropriation with the stipulation that $510,100,100 would be available for an F-14 aircraft program of not less than 48 aircraft subject to: (1) not increasing the selling price for the LOT V option in the F-14 contract between the Navy and the primary airframe contractor, except in accordance with the terms of such contract, including the clause providing the normal technical changes; and (2) the Navy exercising the option for LOT V on or before 1 October 1972 or any subsequent date prior to 31 December 1972 as may be mutually agreed upon by the Navy and the contractor without additional cost to the Government and within the present contract terms and conditions; (3) provided that in the event the Secretary of Defense determines that any condition prescribed in Clause (1) or (2) cannot be met, he shall report such fact to the Congress within 90 days after such determination, together with his recommendations regarding the future of the F-14 program.

Pursuant to the Congressional authorization, LOT V option exercises date was extended from 1 October to 15 December 1972.

In October of 1972 the Navy began intensive informal discussions with Grumman which brought about general agreement on many fundamental production and financial provisions, but no agreement on Lot V performance.

On 14 November 1972, Grumman's 3rd Quarter Report accounted for an additional $20,000,000 loss on LOTS I through IV. On 16 November 1972 the Navy advised Grumman of its intention to exercise the LOT V option and requested the company's formal position. On 17 November 1972 Grumman replied by letter stating that nothing which had happened since January 20, 1972 had improved their financial situation; that they could not accept such option and they would have no recourse but to assert their legal position that the options were invalid; and that they had a wholehearted desire to find an acceptable solution to the critical contract problem which both parties faced. On 8 December 1972 the Navy exercised the LOT V option. On December 11, 1972, Grumman rejected the option exercise, advised it would cease all LOT V effort, and immediately issued LOT V stop-work orders to its vendors and subcontractors.

Discussions between Grumman and Navy teams continued. On 1 March 1973, a contracting officer's decision determined the option exercise was valid and required resumption of LOT V performance. On 8 March 1973, an agreement was reached which required Grumman to perform all contract obligations regarding Lots I through V and entailed Grumman's forfeiture of all rights

to challenge the validity of, enforceability of or exercise of options for Lots I through V. The Navy agreed to forego any option subsequent to Lot V and to increase the progress payment rate or relax certain advance payment agreement covenants.

On 4 April 1973, the request for proposals for the FY 1974 F-14 aircraft program was issued. On 9 April 1973 a SECNAV Memorandum of Decision authorized deletion of Lot VI through VIII options and required a waiver by Grumman of their right to contest the validity of the contract and options through Lot V. In July, a Senate Armed Services Committee letter to DEPSECDEF limited FY 1974 F-14 authorization to $197,600,000 long-lead through December 1973. It also recommended FY74 negotiations for 50 F-14A aircraft be completed by the end of August and expressed frustration over the delay in Lot IV and V negotiations. On 26 July 1973, Grumman submitted their proposal for 50 FY1974 aircraft. On 31 August 1973, the definitized Lot IV (FY72) and Lot V (FY73) contracts were presented to the Senate Armed Services Committee Staff. The proposed FY74 contract was also presented and on 24 September this contract was agreed to by Grumman and the Navy, providing there was no substantial change by subsequent Congressional action.

During the fall of 1973 and the spring of 1974, negotiations continued between Grumman and the Navy on financial arrangements. On 4 June 1974, Congress was notified by the SECDEF of Grumman's

additional advance payment requirements. In January of 1974, the Government of Iran had officially entered into an agreement with the U. S. Navy to purchase 30 F-14 aircraft. They subsequently agreed to purchase 50 more aircraft in June of 1974. On 13 August 1974, Congress passed the Proxmire Resolution which denied the $100,000,000 in advance payments that Grumman required but did authorize a $25,000,000 advance payment. On 3 October 1974, Grumman announced agreements with Bank Melli Iran and a consortium of U. S. banks that would provide $200,000,000 financing over the next four years. This arrangement solved Grumman's credit difficulties and permitted the continued production of F-14 aircraft.

Although it is not readily evident in the problem context, feelings from the F-14 Project Office were that Grumman had control throughout this entire evolution and seemed secure in the knowledge that the government would provide relief. The U. S. Government was the instigator and prime agent in the financing arrangements that ultimately solved Grumman's problem.

Other normal financial problems also occurred during the F-14 Acquisition Cycle such as overruns in program unit cost and total program cost, but the problem just discussed was considered a major management problem in the F-14 acquisition cycle and was thought to be responsible for the overruns incurred. Official statements attribute cost increases to the increased capabilities demanded as a replacement system. [Note:

According to Joe Garvin, Jr., Grumman Aerospace President and Chairman of the Board, 40% of the company's aerospace business is currently represented by the F-14.[19]]

In the F-15 program, two major events contributed to cost growth which resulted in the Air Force having to decrease its F-15 production rate from nine per month to twelve per month to remain within Congressional appropriations. This revision put about 200 airplanes into the 1980-1982 period instead of virtually completing the production run by 1979. The first problem area is very sensitive and from conversations with the F-15 Systems Program Office they feel they suffered undue criticism resulting from a situation out of their control. The Navy and the Air Force were involved in a joint aircraft engine development effort with Pratt and Whitney. Pratt and Whitney was developing the F100/F401 engine program for the Grumman F-14 and the McDonnell Douglas F-15. The Navy felt that the engine was inadequate for its operational needs and pulled out of the concurrent development and individually contracted for another engine. The Air Force System Program Director had to choose between schedule slippage as a new engine contract was arranged or maintaining the present engine production which would be significantly more expensive now that incurred costs would not be divided between the two services. The decision

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[19]Brown, Michael, "Tomcat Joins the Fleet: F-14 Fully Operational," Interavia, December 1974.

was made to continue present engine development and this resulted in a $500,000,000 cost increase. The Systems Program Officer had to make a tradeoff decision and the Air Force feels the correct decision was made. Additional schedule slippage as a result of a new engine development program would have led to more increased cost growth as the Acquisition Cycle pushed forward in time.

The other major event that contributed to the $2.4 billion total program cost growth as of the end of FY76 was one that the Air Force feels it had no control over. This was the period between 1970-1974 when excessively high unforecasted inflation was at work in the American economy. The Systems Program Office was able to predict the results of this bottled-up energy of four years of excessive inflation in December of 1974, when it attached overrun dollar figures to the program.[20] The Systems Program Office also feels that McDonnell Douglas was not realistic in their forecast figures during this inflationary period and this also added to the problem. Presently the Air Force is trying to estimate the cost growth that inevitably will result from reduced production rate and a delayed completion on the production contract.

In reviewing these major problem areas in the F-14 and F-15 programs, it is the author's contention that the solutions to

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[20] Gregory, William H., "Inflation Boosts F-15 Program Cost," Aviation Week and Space Technology, 2 August 1976.

the problems were inevitable and controlled by environmental events. This is not an insinuation of poor management practices but perhaps a realistic look at how little control a Program Manager may have over his own program. He can be literally overwhelmed by major economic forces beyond his control, and perhaps at times beyond anyone's control.

## VI. SUMMARY

This thesis has been an attempt to point out the differences in Aircraft Acquisition Management between the Air Force and the Navy by examining and comparing their management practices and techniques.

In summary, the ultimate goal in both services' Aircraft Acquisition Programs is almost identical. The resources, expertise and tools available for utilization in the Acquisition Process are also very similar but it is service application that brings about the differences.

Detailed difference discussion comprised the body of this thesis. In summarizing, however, the author would like to back away from detailed description and attempt to generalize on two points perceived as very important in the differences in Aircraft Acquisition Management and propose that perhaps these are the driving force for all the differences found. These two points were neither substantiated nor denied by the services and are just a hypothesis on the author's part that perhaps can never be tested.

The first point deals with strategy: the Navy's strategy in an Aircraft Acquisition revolves around flexibility and reactivity. It perceives the aircraft acquisition world as being very volatile and the key to success lies in its ability to react quickly and efficiently to any event or circumstance and to be flexible enough to channel efforts up whatever avenue dictates success. The Air Force strategy in an Aircraft Acquisition revolves around removing as much of the uncertainty as possible. This is accomplished through extensive standardization and detailed procedures. The Air Force seems to believe that the key to success in an aircraft acquisition is to remove as many variables as possible thus somewhat stabilizing the environment.

The second point revolves around control as a result of diversification. It seems readily apparent that the Commander, Naval Air Systems Command exercises much more control over the acquisition process than does the Commander, Aeronautical Systems Division even though both occupy the same relative position in the command chain. The author feels that this is a result of the acquisition diversification in the Navy. The Chief of Naval Material is involved in acquiring weapon systems for three major and totally different operating environments - air, surface and subsurface. He therefore has to rely on the System Commands for control and expertise in Weapon System Acquisitions for their individual environment. The Commander,

Air Force Systems Command, counterpart to the Chief of Naval Material, finds almost all of his weapon system acquisitions related to the air operating environment. His knowledge and expertise is therefore centered and he can exercise more control over the Acquisition Process because of this operating environment focusing effect. Much of the responsibility and control exercised by Commander Naval Air Systems Command is retained by the next echelon level in the Air Force, the Air Force Systems Command.

It is felt that the difference between the services on these two major points provide a cause and effect relationship to the more detailed differences found in the Aircraft Acquisition Management practices and techniques described.

## VII. CONCLUSIONS AND RECOMMENDATIONS

The differences in Aircraft Acquisition Management practices between the Air Force and the Navy are minimal when compared to the similarities. These differences essentially do not evolve from techniques as much as from applications of techniques. The author feels that this is a reflection of the attitude of control and routinization found in Air Force Aircraft Acquisition versus the act and react mode of operations found in the Navy's Aircraft Acquisition Management.

To conclude this thesis the author would like to make two points and from these points construct some recommendations

that could aid the Aircraft Acquisition Process in both services.

The first point is that the Aircraft Acquisition Management field is understaffed in the area of personnel with business and financial management expertise. The Acquisition Managers venture into big business dealings in Aircraft procurement, sometime lacking the business expertise necessary to cope with the competitive environment they should be attempting to control. Expertise in technical fields and in defining operational needs is adequate, but the deficiency in business and financial management capabilities that is sometimes evident could be extremely detrimental to the acquisition program. The need for improvement in this area is readily recognized and efforts are currently underway to narrow this deficiency gap, but the process will take time and immediate relief is not foreseeable nor feasible.

To be realistic, the aerospace contractor is not a partner in a business venture and by virtue of the nature of his conduct the Acquisition Manager should be maintaining an arms-length relationship. In conducting business with the Department of Defense the contractor marshalls years of educational and practical business and financial management experience. Unfortunately at times the Department of Defense is forced to conduct its part of the acquisition with relatively inexperienced personnel, inadequately trained with a duty tour rotation

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that is contrary to continuity and involvement. Many times the Acquisition Manager has to elicit the help of the contractor in order to sell the Aircraft program effectively to higher levels and insure correct and proper business procedures are adhered to. As was mentioned before, in theory, however, the Acquisition Manager should be maintaining an arm's length buyer-seller relationship with the contractor. At times the DoD Acquisition Manager is forced to supplement his business and financial management expertise by contracted consulting firms. It would be better to employ the resources on internal expertise.

Both services have constructed advanced education curricula in Acquisition Management and created a subspecialty in acquisition that can be attained through education or practical experience. Both services are correcting the image of subperformers being detailed to the Acquisition Management field. New screening processes and recent promotion selections are indicative of the high caliber of personnel the services feel are necessary to maintain quality in Acquisitions Management.

Why not go a step further, however? It is apparent that Systems Acquisition is big business. In Fiscal Year 1977, 9.5 billion dollars will be budgeted for Aircraft procurement. The total System Acquisition budget for the Department of Defense will be well over three times this amount. With the large amounts of money involved and the emphasis placed on proper

resource allocation and cost control, why not create an Acquisition Management Corps similar to the Supply Corps or the Civil Engineer Corps? For this Acquisition Corps create a set career ladder where one can advance up the ranks in this specialty and be competitive with officers in other specialties for promotional opportunities! Recruit into this Corps individuals with business and financial management and technical backgrounds and then supplement this with advanced education in these specialties. This prevents rotation from removing an individual from the acquisition environment for a three-year tour in an operational status and then returning him to have to refresh and catch up as in the present projected method. Operational expertise could be provided by representatives in the Acquisition Programs and the author feels it is not essential for an Aircraft Acquisition Manager to be an operator as long as the expertise is available through representatives and the needs are incorporated.

Once this corps has been created, staff an Acquisition Program with these individuals and let them remain with the Program for its entire duration. If the key decisions are to be made by military managers the continuity, familiarity and involvement this approach provides is essential. As an individual advances up the career ladder he can move up the chain in his Aircraft Acquisition Program to assume greater

responsibility, with the gaps at the bottom of the hierarchy being filled by new personnel. When an Aircraft Acquisition is complete, these individuals can then staff another Acquisition Program. This Acquisition Corps concept can be equally applied to a Program or Matrix organizational structure. It is felt that this is a feasible solution to a critical problem and would provide great benefits to the Aircraft Acquisition Process in the Navy and the Air Force or all DoD agencies procuring aircraft or any system for that matter.

The second point is that increased intraservice cooperation and information flow would prove extremely beneficial to both services. Due to the heavy tasking in Aircraft Acquisition, proper information flow between the services seems to receive a very low priority. The F-14 and F-15 were very similar procurements, yet the two Program Officers were so deeply involved in their own programs with extremely heavy tasking that minimal information exchange occurred.

At this point it would seem appropriate to digress a moment and reflect on a point that has been hotly contended for years and on which the author has formed some opinionated views based on the research done, the point being co-procurement of one aircraft type by the Navy and the Air Force. The question is continually raised, especially by those committees in Congress concerned with funding aircraft acquisition programs, as to why the services can't procure one aircraft that would fit

both their needs. The baseline argument that is usually presented is that differences in operational environments necessitate different types of aircraft with different capabilities. This is in fact a partial justification, but the author feels that intraservice rivalry for funding and the autonomous existence that has resulted is also a key element in this individualistic approach to aircraft procurement. The author feels that with proper coordination and planning, perhaps one aircraft could be procured by both services with specific modifications utilized to negate the differences in operating environment and mission. This co-procurement concept would hold true only when dealing with fighter and attack aircraft as this is where similarity in aircraft type is feasible. The F-4 and A-7 are good examples of this dual utilization of one aircraft type. The F-4 was probably the most versatile and successful aircraft deployed to date by either the Navy or the Air Force and required only minor modifications to adapt it to each service's specific needs. As the author traced the development of the F-14 and F-15, the opinion grew that one aircraft procurement might have satisfied the needs of both services. Combined RDT&E efforts, pooling of resources and expertise, one central program supported by both services in the PPBS cycle and in the political battle would reap enormous benefits in cost savings and also in helping to alleviate Congressional criticism of service aircraft acquisition. As one looks to the futue in attack and fighter aircraft, especially considering the

trend to VSTOL aircraft, the co-procurement philosophy becomes more feasible and perhaps presents a realistic solution to cost savings problems and the allocation of scarce resources in aircraft acquisition.

Even if the co-procurement policy never emerges, there is a real need to enhance the information flow between the two services in the aircraft acquisition world. Presently this information flow is minimal and receives low priority. The author feels a more active exchange of information could be extremely beneficial.

Why not set up a combined information system coordinated by a common office that provides equal accessibility by either service? This information system should be structured to provide not only historical information but current data to provide the services with all available information to facilitate their management of aircraft acquisition. In addition, set up periodic conferences between key aircraft acquisition personnel individuals to provide more interface between the services and interchanges of ideas.

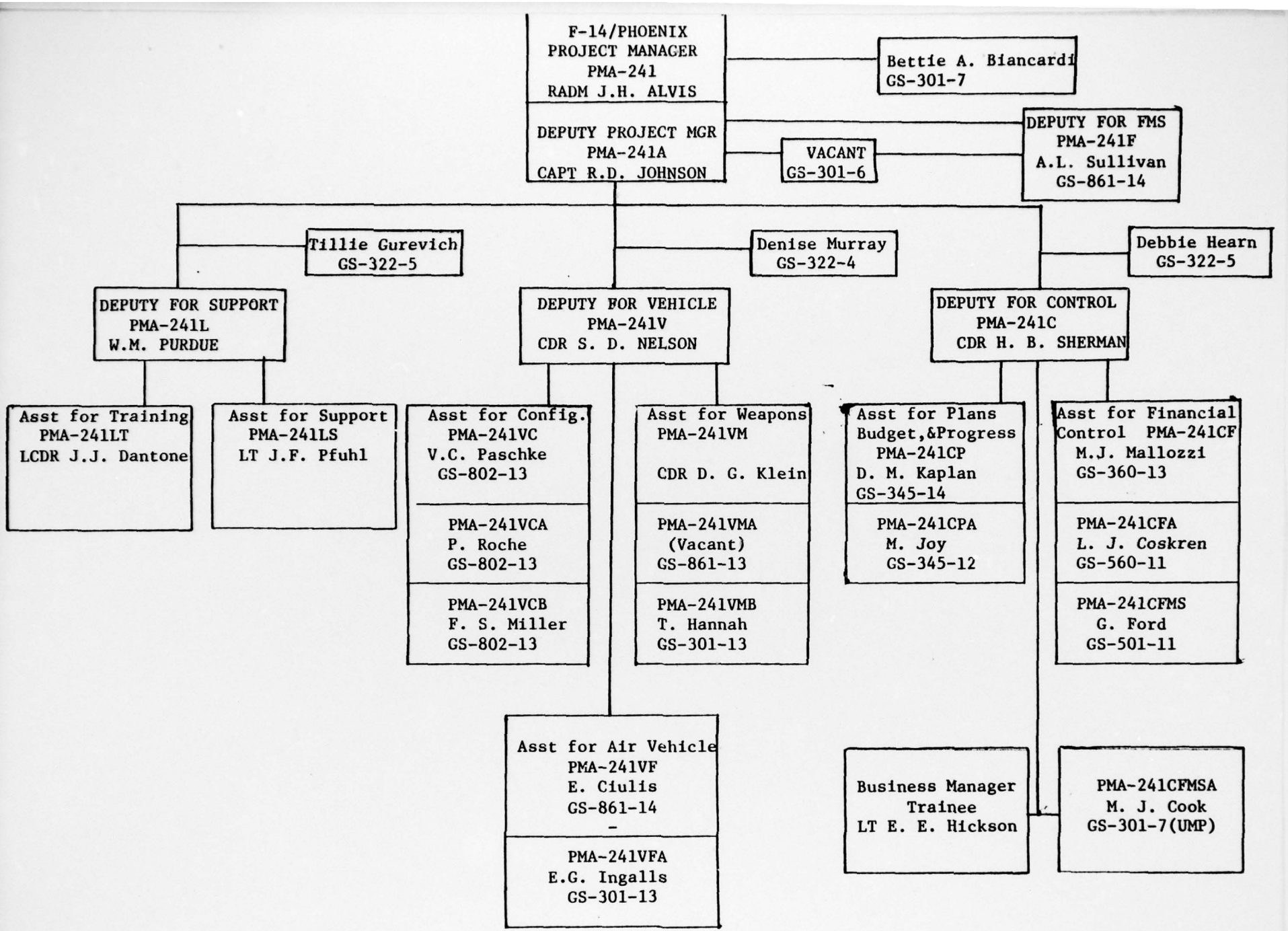
The scarcity of resources and concurrent intense scrutinization of programs for funding is a reality that has to be accepted and one the Department of Defense will have to live with indefinitely. By its very nature this creates competition between service sisters for individual program funding. If something is not done, this competition and resulting

isolationistic attitude can not help but intensify with the results being ultimately detrimental. Increased cooperation, coordination and interchange is the initial step to rectify this possibility and will benefit the aircraft acquisition systems for both the Navy and the Air Force.

## RELATED POLICY DOCUMENTS

The listed DoD documents contain policy in specific functional areas dealing with system acquisitions.

| DOCUMENT | NUMBER | SUBJECT |
|---|---|---|
| DoD Instruction | 4005.3 | Industrial Preparedness Production Planning Procedures |
| DoD Manual | 4005.3M | Industrial Preparedness Planning Manual |
| DoD Directive | 4100.35 | Logistic Support |
| DoD Directive | 4105.62 | Proposal Evaluation and Source Selection |
| DoD Directive | 4120.3 | Standardization |
| DoD Directive | 4155.3 | Quality Assurance |
| DoD Instruction | 4200.15 | Manufacturing Technology |
| DoD Instruction | 4400.1 | Priorities and Allocations |
| DoD Directive | C4600.3 | Electronic Counter-Countermeasures (ECCM) |
| DoD Directive | 5000.3 | Test and Evaluation |
| DoD Directive | 5000.4 | Cost Analysis Improvement Group |
| DoD Directive | 5000.23 | Management Careers, System Acquisition |
| DoD Directive | 5000.28 | Design to Cost |
| DoD Directive | 5000.30 | Defense Acquisition Executive |
| DoD Instruction | 5010.8 | Value Engineering |
| DoD Instruction | 5010.12 | Data, Acquisition of |
| DoD Instruction | 5010.29 | Data, Acquisition of |
| DoD Directive | 5100.40 | Responsibility for the Administration of the DoD Automatic Data Processing Program |
| DoD Directive | 6015.1 | Environmental Considerations in DoD Actions |
| DoD Directive | 7000.1 | Resource Management Systems of the DoD |
| DoD Instruction | 7000.2 | Cost/Schedule Control System |
| DoD Instruction | 7000.3 | Selected Acquisition Report (SAR) |
| DoD Instruction | 7000.6 | Management System Control |
| DoD Instruction | 7045.7 | The Planning, Programming and Budgeting System |
| DoD Manual | 7110-1-M | DoD Budget Guidance Manual |
| ASPR | | Armed Service Procurement Regulations |


F-14/PHOENIX
PROJECT MANAGER
PMA-241
RADM J.H. ALVIS
Bettie A. Biancardi
GS-301-7
DEPUTY PROJECT MGR
PMA-241A
CAPT R.D. JOHNSON
VACANT
GS-301-6
DEPUTY FOR FMS
PMA-241F
A.L. Sullivan
GS-861-14
Tillie Gurevich
GS-322-5
Denise Murray
GS-322-4
Debbie Hearn
GS-322-5
DEPUTY FOR SUPPORT
PMA-241L
W.M. PURDUE
DEPUTY FOR VEHICLE
PMA-241V
CDR S. D. NELSON
DEPUTY FOR CONTROL
PMA-241C
CDR H. B. SHERMAN
Asst for Training
PMA-241LT
LCDR J.J. Dantone
Asst for Support
PMA-241LS
LT J.F. Pfuhl
Asst for Config.
PMA-241VC
V.C. Paschke
GS-802-13
PMA-241VCA
P. Roche
GS-802-13
PMA-241VCB
F. S. Miller
GS-802-13
Asst for Weapons
PMA-241VM
CDR D. G. Klein
PMA-241VMA
(Vacant)
GS-861-13
PMA-241VMB
T. Hannah
GS-301-13
Asst for Plans
Budget,&Progress
PMA-241CP
D. M. Kaplan
GS-345-14
PMA-241CPA
M. Joy
GS-345-12
Asst for Financial
Control PMA-241CF
M.J. Mallozzi
GS-360-13
PMA-241CFA
L. J. Coskren
GS-560-11
PMA-241CFMS
G. Ford
GS-501-11
Asst for Air Vehicle
PMA-241VF
E. Ciulis
GS-861-14
PMA-241VFA
E.G. Ingalls
GS-301-13
Business Manager
Trainee
LT E. E. Hickson
PMA-241CFMSA
M. J. Cook
GS-301-7(UMP)

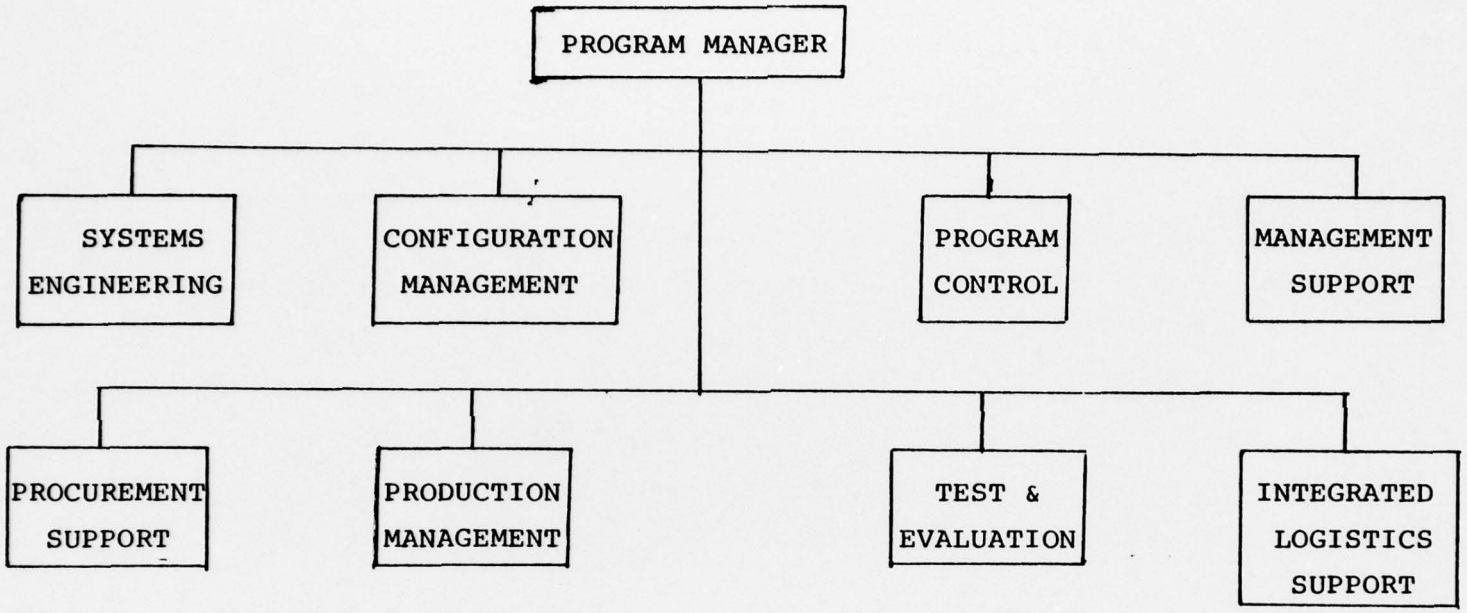
APPENDIX B

F-14/ Phoenix Project Management Office
Personnel Breakdown

| Number | Rank | Management | Secretarial | Engineering |
|---|---|---|---|---|
| 1 | RADM | 1 | | |
| 1 | CAPTAIN | | | 1 |
| 3 | CDRS | 1 | | 2 |
| 1 | LCDR | | | 1 |
| 2 | LT | 1 | | 1 |
| 4 | GS-14 | 1 | | 3 |
| 7 | GS | 1 | | 6 |
| 1 | | 1 | | |
| 2 | GS-11 | 2 | | |
| 2 | GS-7 | | 2 | |
| 1 | GS-6 | | 1 | |
| 2 | GS-5 | | 2 | |
| 1 | GS-4 | | 1 | |
| 28 | | 8 | 6 | 14 |

APPENDIX C

TYPICAL PROGRAM OFFICE

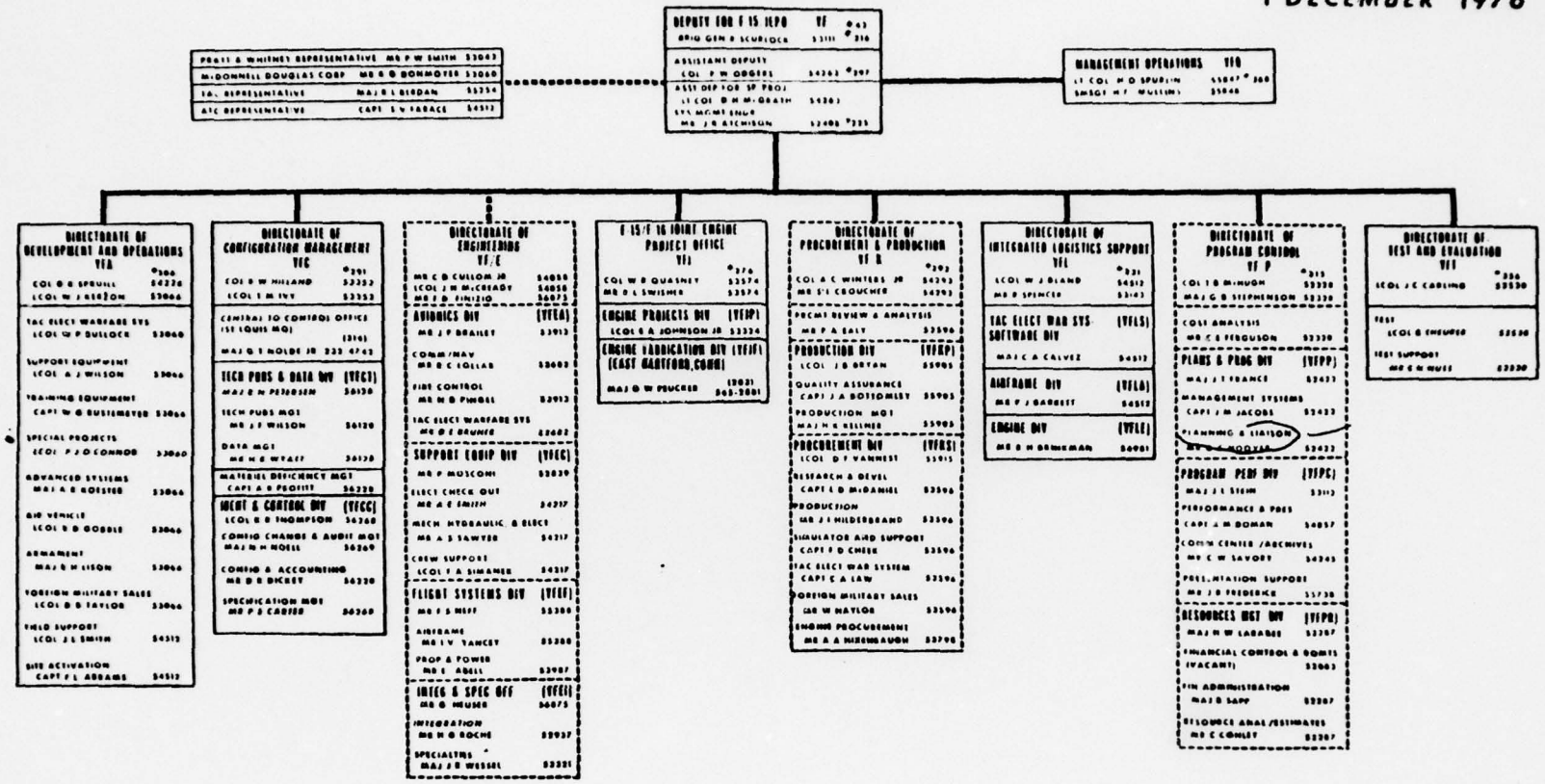



APPENDIX D

# F-15 SYSTEMS PROGRAM OFFICE

WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

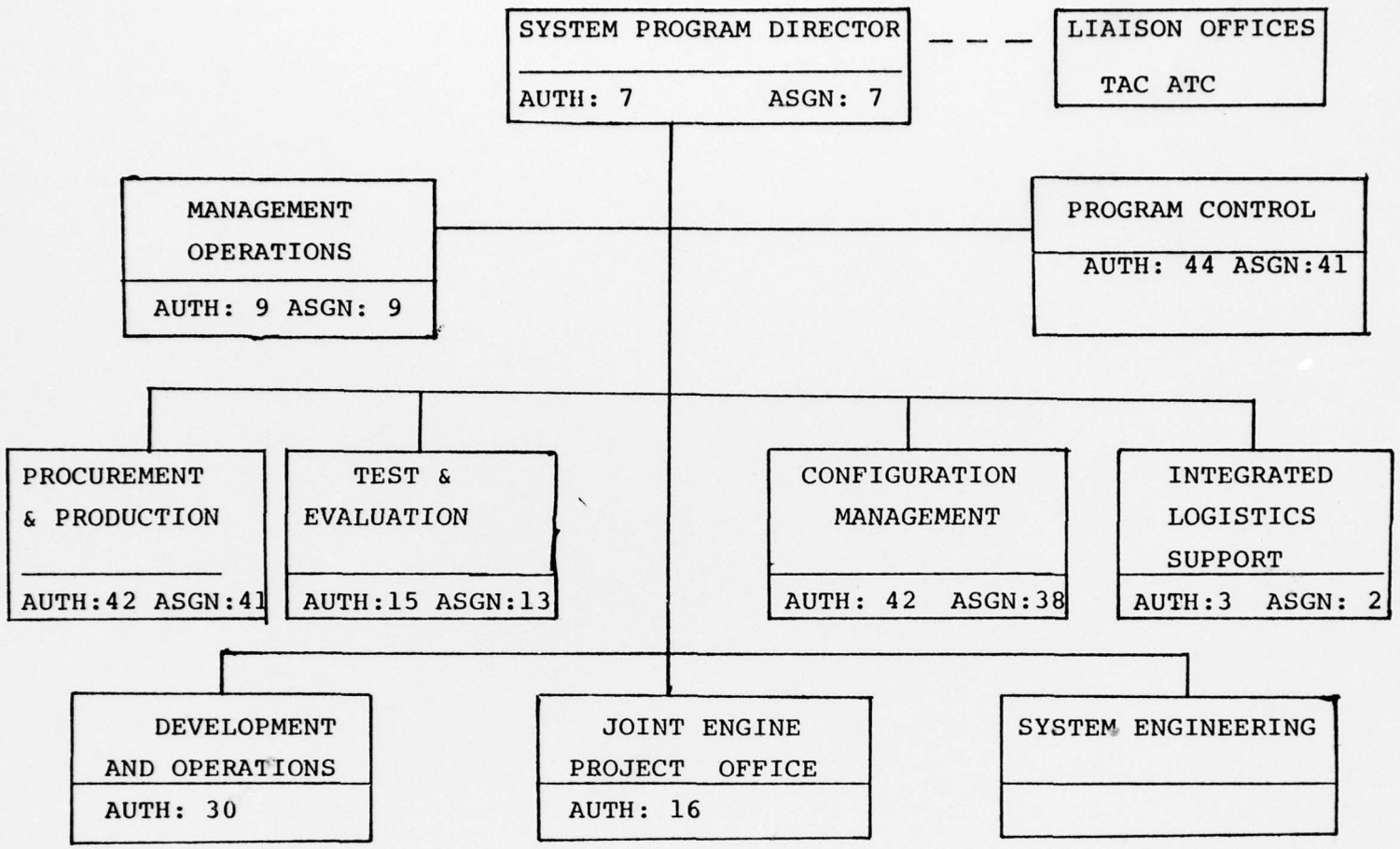
1 DECEMBER 1976




*PAS (AIR FORCE COMMAND MISSILE COMMUNICATION SYSTEM)

APPENDIX E

F-15 SYSTEM PROGRAM OFFICE




APPENDIX F

F-15 TECHNICAL/SYSTEM MANAGEMENT PERSONNEL

| ASSIGNED RANK/GRADE | MANAGEMENT | ENGINEERING | TOTAL |
|---|---|---|---|
| MILITARY | | | |
| BRIG GENERAL | 1 | - | 1 |
| COLONELS | 6 | - | 6 |
| LT COLONELS | 21 | 2 | 23 |
| MAJORS | 20 | 1 | 21 |
| CAPTAINS | 48 | 6 | 54 |
| LIEUTENANTS | 5 | 5 | 10 |
| AIRMEN | 19 | 1 | 20 |
| TOTAL MILITARY | 120 | 15 | 135 |
| CIVILIAN | | | |
| GS-16 | - | 0 | 0 |
| GS-15 | 2 | 4 | 7 |
| GS-14 | 3 | 3 | 6 |
| GS-13 | 15 | 32 | 47 |
| GS-12 | 7 | 14 | 21 |
| GS-11 | 4 | 2 | 6 |
| GS-9 | 4 | 1 | 5 |
| GS-7 | 3 | 0 | 3 |
| BELOW | 37 | 8 | 45 |
| TOTAL CIVILIAN | 75 | 64 | 140 |

EXCLUDES TAC, ATC AND AFLC

AS OF: 1 DEC 76

APPENDIX G

F-15 TECHNICAL/SYSTEM MANAGEMENT

PERSONNEL - EDUCATIONAL BACKGROUND

| | BACHELOR'S DEGREE | MASTER'S DEGREE | PHD/JD |
|---|---|---|---|
| MANAGEMENT | 45 | 89 | 0 |
| ENGINEERING | 48 | 18 | 0 |
| | 93 | 107 | 0 |

AS OF: 1 OCT 76

APPENDIX H

## F-14/PHOENIX PROJECT MANAGEMENT OFFICE

## PERSONNEL - EDUCATIONAL BACKGROUND

| | BACHELOR'S DEGREE | MASTER'S DEGREE | PHD/JD |
|---|---|---|---|
| MANAGEMENT | 2 | 3 | 0 |
| ENGINEERING | 6 | 9 | 0 |
| | 8 | 12 | 0 |

APPENDIX I

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